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'The coldest place on earth . . .'

Antarctica

and the Navy's involvement there — Page 16

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THE COVER

Extreme cold, wind, and continuous darkness make Antarctica a difficult place to work but the CEC and the Seabees are doing it anyway and successfully too. A brief history of their involvement since 1947 is described by the author, beginning on page 16.

NAVY CIVIL Engineer

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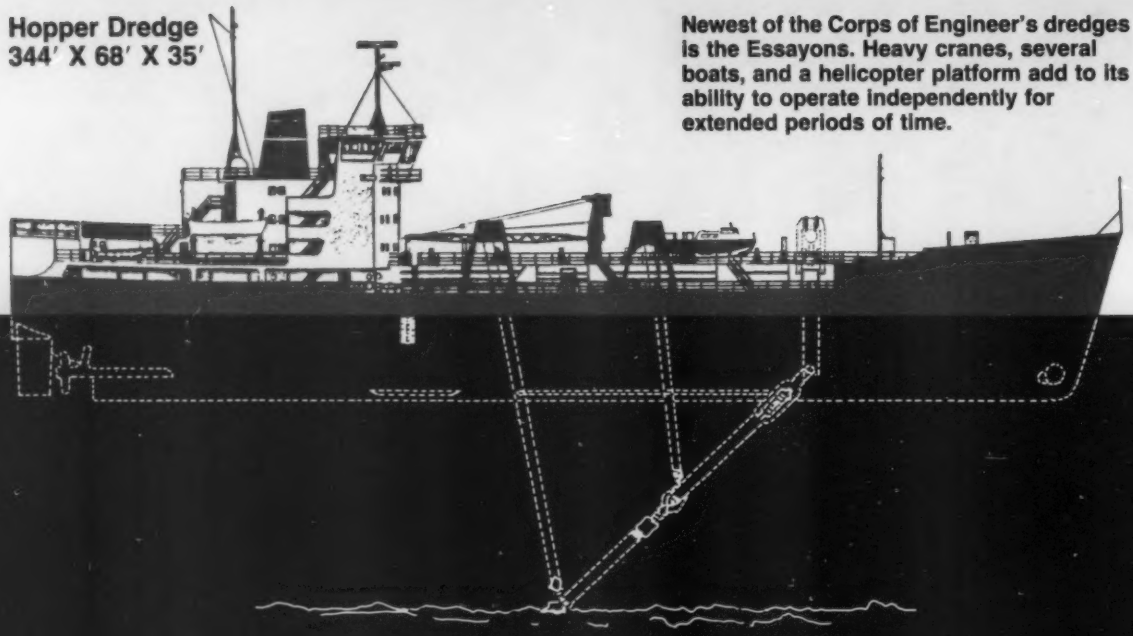


Hopper Dredge
344′ X 68′ X 35′

Newest of the Corps of Engineer's dredges is the Essayons. Heavy cranes, several boats, and a helicopter platform add to its ability to operate independently for extended periods of time.

The new look in dredging

By CDR DAVID H. GROVER
USNR (Ret)
and
JEFF L. GROVER
P.E., Calif.

• Napa, Calif.

Through the years dredging has been about the most mundane and repetitively dull activity that civil engineers encountered in port improvement and maintenance work. Now, thanks to recent federal legislation, it has taken on a very different look, with a hungry new group of players and the latest in equipment promising greater productivity and cost-effectiveness as well as an inherently more interesting process.

Prior to 1978, the Army Corps of Engineers had a virtual monopoly on seagoing hopper dredges, the heavy-duty self-contained vessels which trail large suction pipes underneath with which they suck up silt and sand from entrance channels and harbors into large hoppers for ultimate disposal at a dumping site. Then, five years ago as a result of a national dredging study it had commissioned through the Arthur D. Little organization, Congress passed Public Law 95-269 which made two significant changes in the responsibility for hopper dredging.

First, it directed the Corps of Engineers to turn over the bulk of its hopper dredging activity to private industry, if the private sector could bid satisfactorily on the work planned by the Corps. Second, it mandated the reduction of the Army's fleet of dredges to a "minimum" level — later established at four vessels — from the fifteen which it operated in the mid-1970s.

The remaining fleet would represent a core of vessels necessary for the emergency and national security needs of the United States, together with a reserve fleet of laid-up dredges. In addition, for the first time in eleven years the Army was authorized to build several new dredges to improve the technological capability of its fleet, and to insure better response in meeting military dredging needs.

Since the passage of PL 95-269 a revolution has taken place in hopper dredging. Where there was once only a single privately-owned hopper dredge, now there are ten, representing five different companies. These ten dredges are now doing most of the maintenance dredging previously carried out by the Corps of Engineers, including that involving a number of naval facilities. For example, the Mare Island Channel, serving the Navy's oldest West Coast shipyard, has been maintained for years by Army dredges, but recently was dredged by the Eagle 1, one of the largest of the new privately-owned vessels.

At the same time, three new vessels have joined the Corps' otherwise obsolescent fleet. When two additional older dredges are retired within the next two years the "minimum" fleet will have reached its planned size, with optimum capability to assist the private dredge fleet in meeting heavy workloads caused by seasonal silting from floods or by natural disasters such as the eruption of Mt. St. Helens.

But the most significant aspects of this revolution in dredging are not the numbers or even the newness of the vessels, but rather the technology which has been incorporated into this new generation of hopper dredges. Both the public and private fleets have acquired sophisticated equipment and instrumentation, although the biggest single departure from the traditional mode of dredging — the use of the split-hull design — has been limited to the private fleet. In fact, nine of the ten private hopper dredges have split hulls, a circumstance which calls for a closer look at these vessels.

Traditional hopper dredges dump their loads from a series of compartments through bottom doors. These doors can be slow to operate, and difficult to maintain in good condition; they also protrude below the hull, requiring deeper water for dumping.

In the split-hull design, which was developed by European dredging companies, the hull of the vessel is formed of two sections containing buoyant tanks which are hinged together, fore and aft, at the deck level.

In the closed position the two sections fit together snugly, forming an open hopper into which the material dredged up by the suction pipe is deposited.

When the ship is ready to dump its load at the designated site, hydraulic rams at each end of the vessel push the two sections apart at the bottom, and the dredged material gravitates out, aided by seawater sloshing through the open hull as the vessel maintains a slight way.

After dumping, the hull is closed, and the vessel is ready to return to the channel it is dredging.

The dumping cycle, which normally occurs every two hours or so, can be shortened by several minutes for split-hull vessels over that of traditional bottom-door hopper dredges, with corresponding increases of several percentage points in productivity per unit of time.

But the Army Corps of Engineers, in building three new dredges with the most modern equipment and instrumentation available, has chosen to stay with the traditional bottom-door hull design rather than use the split-hull. The reason announced for this choice was the opportunity to use larger pumps which would be mounted on a hull that was not required to open up regularly, but there may have been other factors in the Army's decision, particularly the untested seaworthiness of the split-hull design.

Inasmuch as split-hull vessels have open hoppers with no covers or beams providing transverse strength, are generally built to a one-compartment standard in resisting hull damage compared to the two-compartment standard of Corps dredges, and have their deck houses suspended on a system of pins and rollers to accomodate the opening of the main deck, the Coast Guard regards them as experimental vessels under the International Load Line Convention of 1966.

As a result, the Certificates of Inspection and the Load Line Certificates issued by the Coast Guard for these vessels are severely restrictive.

The vessels are generally allowed to operate only within twenty miles of shore and only in fair weather — defined as winds of no more than thirty-five knots, and seas of no more than 10 feet.

Normally, these restrictions would not penalize the split-hull dredges vis-a-vis their Corps of Engineers counterparts in carrying out maintenance dredging in American ports, since the Corps dredges are limited in effectiveness by sea conditions to the same degree that the split-hulls are.

Using dredges in support of military actions — one of the collateral duties of the "minimum" fleet created by PL 95-269 — the most dependable vessels are those with the ability to make long ocean crossings, resist damage from hostile action or heavy weather, and be reasonably self-sustaining for considerable lengths of time.

In meeting these criteria, the traditional hull design seems clearly superior to the split-hull design as a military dredge.

Although the civilian-manned dredges of the Corps of Engineers are designed primarily for use on public works projects, they have been utilized in harbor rehabilitation work in military campaigns over a period of 40 years. Corps dredges served with distinction in both the European and Pacific theaters in World War II, as well as in Korea and Vietnam. They also assisted in the clearance of the Suez Canal after the Egyptian-Israeli war of 1967.

It does not require much imagination to foresee the possible need for this kind of dredging again in getting harbors ready for military sealifts in the Indian Ocean and other potential trouble spots of the world.

In a national emergency the new Corps dredges and the older laid-up vessels — some of which were built for military purposes during World War II — can meet this need, while the privately-owned fleet handles the civilian maintenance dredging needs of American ports.

Beyond the unique capabilities provided by hull design there are other important technological advancements in the new generation of hopper dredges. All the new vessels, both split-hull and bottom-door, incorporate the latest equipment and instrumentation, most of which is not unique to dredges.

Propulsion and Steering

All new dredges use diesel power plants and twin-screw propulsion, with horsepowers ranging from 1,700 to 13,900. Most use bow-thrusters for maneuverability, although the two smallest vessels use z-pellers on swiveled shafts, similar to outboard

A dredging technique that eliminates dumping is "sidecasting," in which the material is dumped at the side of the channel – not into the hopper. This increases productivity about 50 percent.

engines, providing high maneuverability without bow thrusters.

The Corps dredges, and the one private dredge with bottom doors, all utilize controllable pitch propellers. Steering is usually accomplished manually while dredging, in order to accommodate the variations in the channel and to maximize control provided by the thrusters or engines.

Pumps

Pumps are the heart of a dredge. The older Corps hopper dredges had only a single centrifugal pump which meant that when the pump was down the dredge was down. Today there is redundancy and cross-over in pumps and suction lines, plus full control of all pumps from the bridge.

Improvements should provide significant gains in productivity and cost effectiveness for hopper dredging in the future.

The two largest new Corps dredges and one private dredge make use of submersible pumps on the suction lines or drag arms, which provide greater suction than that available with pumps located within the hull.

Maximum dredging depths range from 50 feet on the smaller dredges to 94 feet on the largest. Most new hopper dredges also provide for shore pump out by means of periodic connections with floating pipelines for beach nourishment or other constructive use of dredged sand.

Positioning

Utilizing electronic positioning equipment similar to that used in the offshore oil industry, dredges can now be directed by the navigating officer from a graphic plot at the steering console. This plot shows the vessel's location with respect to a grid of the channel being worked.

As boat-based surveys update the soundings through the bridge computer, new plots can be generated showing high spots which require additional dredging.

Automation and Instrumentation

The older generation of hopper dredges had very little automation and sensitive instrumentation, but today control and accurate monitoring of all functions are centralized on the bridge for the navigating officer. As a result, crews have been reduced from the high of 70 or 80 people on the older steam dredges to as few as 16 on the smallest new Army dredge and 12 on the privately-owned vessels.

Sensors automatically send back overboard mixtures of sand and water which are too thin for efficient dredging. Other sensors tied to load meters enable the bridge crew to load the vessel evenly.

The Eagle is the largest of the privately-owned split hull hopper dredges. It was used recently on the Mare Island Channel contract.

Hydraulic rams, called swell compensators, adjust the tension in the cables holding the dragheads against the bottom with correct pressure as the vessel rises and falls with the motion of the sea.

The older generation of hopper dredges had very little automation and sensitive instrumentation.

These and other technical improvements should provide significant gains in productivity and cost effectiveness for hopper dredging in the future. Perhaps other advances can be expected to follow, with fully automated dredging in response to continuously updated plotting coming in the years ahead.

Even with the new look, however, these vessels and the new federal-private partnership in dredging probably will not noticeably alter the relationship of the Navy's civil engineering establishment to maintenance dredging, at least in terms of public works activities in the continental United States.

The Army Corps of Engineers will continue to be primarily responsible for such dredging; it will obtain all required permits and administer all contracts, including those with privately-owned firms covering the use of their dredges.

The changes that are taking place in dredging are worth watching — the beginning of an advanced era.

But somewhat less clear is what the emergence of a stronger and more formalized military dredging capability will mean to civil engineering in the Navy. Harbor rehabilitation in the past has involved a number of specialized functions provided by either or both Army and Navy units: surveys, engineering services, underwater demolition, diving and ship salvage, and construction of port facilities.

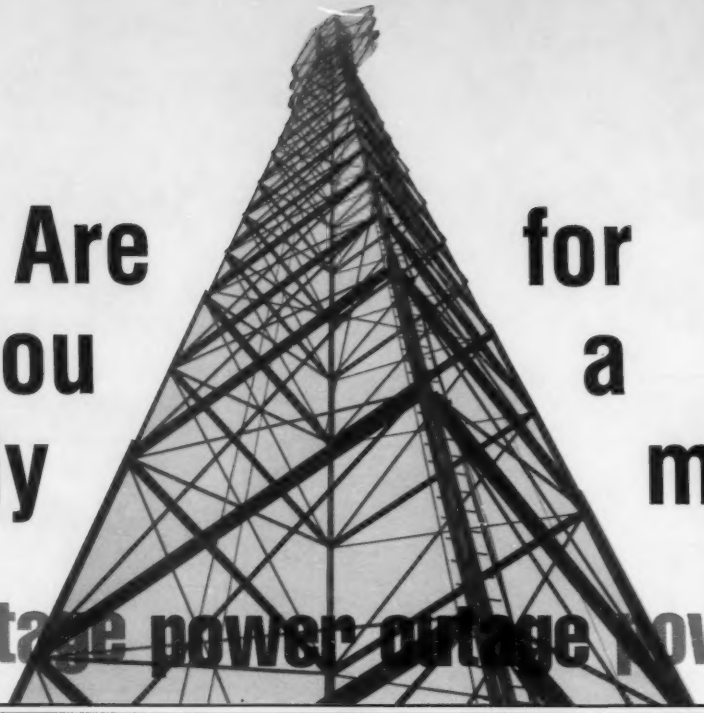
In integrating military dredging into this series of activities it will be necessary to plan for the requisite command, administrative, and logisitical relationships to insure that proper harbor depths can be achieved on time through an orderly sequence of these activities.

In any event, the changes that are taking place in dredging are worth watching. They may represent only the beginning of an advanced era in transporting of underwater materials; already we are witnessing the blending of techniques derived from dredging, ocean mining, and ship salvage into a subsea reclamation technology.

The possibilities for this technology can be mind-boggling if one imagines the military advantage to be gained from reshaping the seabeds of the world to accommodate platforms or undersea structures for weapons systems, monitoring stations, refueling and supply centers, and the like.

In the meantime, dredging will remain — like many other human activities — essentially repetitive, but it will probably never again be the dull prosaic process it once was. □

Are you ready for a major power outage



BY CAPT J. R. JACOBSEN, CEC, USN (Ret)
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In December 1982, the Mare Island Naval Complex suffered a sudden and complete loss of electrical power as a result of the destruction of a transmission line tower during a severe windstorm. Commercial power was restored after a four-day and eight-hour outage. When such an event occurs, extraordinary recovery operations must be undertaken to provide interim services and minimize the impact on numerous critical operations. Such an event also produces new lessons learned toward further enhancing response capabilities.

Pre-Outage Conditions on Mare Island

The Mare Island Naval Complex consists of the Shipyard, the Naval Station and about 30 tenant commands and activities. The main facilities include four dry docks, two building ways, 10 quaywall berths used for submarines in overhaul or homeported, three finger piers used primarily by homeported surface ships, about 1000 buildings, a utilities plant, and extensive utilities systems including over 150 miles of electrical distribution lines. Current plant value is approximately $1.6 billion. The total Mare Island population, including civilians, military personnel and dependents, is nearly 20,000.

Electrical power to Mare Island is supplied by two 115KV transmission circuits supported on common towers. These lines are approximately four miles long and cross the 2,000 ft. wide Mare Island Strait. They provide the only connecting link to the commercial (PG&E – Pacific Gas and Electric Co.) power system.

Up until the late 1950's, Mare Island Naval Shipyard had steam turbine generating capacity of approximately 20-MW. However, as the outdated and worn-out turbine generators became uneconomical to overhaul and operate and since very favorable power rates were available from Western Area Power Administration, most of the units were gradually phased out of operation and dismantled.

By the late 1970's, only one 5-MW turbine generator remained. This unit has been kept in operating condition through regular maintenance and periodic operation, but due to its advanced age, its reliability has been considered only marginal.

Steam generating capacity on Mare Island is plentiful (two modern 150,000 lb/hr, 600 psig boilers and one older unit of identical capacity), but it has been recognized for many years that in the event of a sudden loss of commercial power, a cold start of the boiler plant using equipment available at the plant is not possible, since standby gas or diesel powered electric generators are not an integral part of the utilities plant. →

Mare Island uses about 26 MW daily

Although the sole commercial source of power has been considered reliable, and the possibility of transmission tower or line failure considered remote, the existing situation was nevertheless recognized as not being fully satisfactory, particularly in view of the potentially serious consequences of a total power outage. Accordingly, two projects were identified in the 1970's to improve the situation:

- A utility plant standby diesel electric generator of sufficient capacity to operate auxiliary equipment necessary to bring a main boiler on-line. This would allow a cold start of a boiler and ensure steam for generating about 5-MW of power from the one remaining turbine generator. Competing in the past for scarce OPN funds, this project was not funded.
- Provisions for an alternate commercial electric feeder to Mare Island were identified in 1978 under MCON Project P-229. This project will provide an alternate source of power from a different portion of the commercial grid and through separate switching stations than those used by the existing 115KV commercial lines. This project is included in the approved FY '83 MCON program.

On a typical working day, the electrical demand on Mare Island is approximately 26-MW, with about 80% consumed by the Shipyard. The commercial 115KV power supplied to Mare Island is distributed on Mare Island by complex internal networks consisting of an old 2.3KV system and a more recent 12KV system. The power is reduced to lower voltages at 24 widely scattered substations, which, except for most of the waterfront, are not centrally/remotely controlled.

Central control of electric dispatching was maintained in the plant. The Mimic Board became an invaluable tool for continuously documenting the status of all switching equipment in the system throughout Mare Island.

Failure Mode

On the afternoon of December 22, 1982, an unusually sudden and heavy windstorm hit the central California coast, causing widespread damage. At 4:07 p.m., Mare Island suddenly found itself without power. Shortly thereafter, communications with PG&E confirmed an initial report that the 320-ft., PG&E transmission tower on the east side of Mare Island Strait (opposite Mare Island) had collapsed, causing loss of power and the 2,000 ft.-span transmission lines to drop into Mare Island Strait. As the storm moved inland, PG&E experienced similar tower losses in other areas of the state and was faced with widespread and extensive power outages.

Impact on Mare Island

The sudden loss of electric power left Mare Island in total darkness, except for a few areas having built-in generator or battery capability, including: ships, Communication Center (NTCC), certain security lighting, Utility Plant emergency lighting, radio transmitter, Emergency Control Center, salt water system, Calibration Laboratory, fire alarm system (battery powered), dry docks (power to support critical functions), telephone system (partially functional), Police Station, and service dispatcher.

With the loss of power and recognizing that the time needed to restore even temporary commercial power would be measured in days and not hours, immediate assessment began of the consequences of operating without power for such critical functions as providing shore power to the ships in overhaul at the Shipyard, security and fire fighting, safety of personnel, dry dock drainage, sewage pumping stations, industrial air, frozen storage, housing and feeding of Mare Island occupants, etc.

Command and Control

In order to provide the most effective control and coordination of all Mare Island activities and the curtailment of normal operations during the power outage, the Emergency Control Center (ECC) was activated shortly after the power failure occurred. This also allowed the Shipyard and Naval Station to provide higher commands and the public with current, accurate and comprehensive status reports regarding Mare Island. The ECC, with rotating around-the-clock watches, was headed up by a duty captain and included representatives from the Shipyard, Naval Station, and key tenant commands.

A separate Public Works Department control center was established in the nearby Utilities Plant. The control center coordinated utilities dispatching and field work, provided frequent updates and recommendations to the shipyard commander and the ECC on the power restoration efforts and received direction and guidance on priorities of the allocation of the limited but gradually increasing amounts of electric power which became available during the outage.

It became apparent early in the outage that the duration would be extensive and that, at best, only limited temporary power could be generated on Mare Island. Thus, on December 22, the decision was made to send home all but essential Shipyard employees who had just reported for swing shift work. Almost all Public Works Shop personnel were retained or recalled and continued to man long shifts throughout the outage.

Interim Power Restoration

During the evening of December 22, portable generators available on Mare Island were first dispatched to critical functions such as dry dock stripping pumps, Police Station (additional capacity), Emergency Control Center (additional capacity), fire stations, sewage pumping stations, and Public Works Gas Station. Installation of remaining portable generators proceeded during the evening and into the following day.

Early in the evening of December 22, it was decided that the method most likely to succeed in bringing power to the boiler plant auxiliary equipment would be to utilize the 500 KW standby generator permanently installed at the Dry Dock #2 stiffleg crane. This was accomplished by connecting it into selected routing through the Shipyard electric distribution system and eventually backfeeding power into the Utilities Plant.

Since this crane was not in service at the time, the generator became available at a critical time. Following careful shedding of other loads along the selected transmission route and the installation of special temporary connections, the boiler auxiliary equipment was energized and a boiler fired up approximately eight hours following the PG&E power loss. Approximately three hours later, (at 3:30 a.m. on December 23), the steam turbine generator began generating power, which was immediately made available to the waterfront substations providing shore power to ships.

These four units were quickly dispatched on a 10-hour road trip and began arriving on Mare Island within 15 hours after the initial telephone contact. Seabee operators from Port Hueneme were also provided for starting, operating and troubleshooting these units.

In addition, six - 200-KW diesel generators were provided from the Civil Engineering Support Office, also at Port Hueneme. As the large gas turbine generators became available, they were strategically located in the Mare Island distribution system, so as to provide backup power to the Shipyard waterfront, as required, as well as power to other critical activities.

Since these units require JP-5 fuel for operation (diesel fuel operation is possible, but not preferred), a special dispatching of substantial amounts of fuel by barge and tank trucks from the Navy's Point Molate fuel depot was initiated.

The maximum amount of power available from all the 50 or so portable generators which were brought into service during the outage, as well as the steam turbine generator, was approximately 14 MW. As the scenario progressed and it became clearer as to the total generator capacity which would be available, relative priorities for power distribution were established with close coordination between the Public Works Department and the Emergency Control Center.

Following the activation of temporary electric service for the most critical operational demands,

Fifty portable electric generators up to 2000 KW capacity were connected to critical points of the Mare Island electric distribution system. Personnel are working with a 60-KW generator.

A 2000-KW gas turbine generator was provided to Mare Island from the Naval Environmental and Energy Support Activity, CBC, Port Hueneme. This and other mechanical-electrical equipment is available for emergency use under a Navy program.

View of central and northern portions of Mare Island. The shipyard industrial area adjoins the Mare Island Strait at the right of the photo.

facilities such as unaccompanied personnel and family housing were gradually provided with power; most housing facilities had power by the early evening of December 23 and as Christmas Eve arrived, all military personnel and their dependents living in Mare Island quarters had received power.

Carefully controlled directions from the utilities dispatchers (in the Utilities Plant Control Room) to the many field crews manually opening and closing breakers throughout Mare Island were key factors in the safe and efficient expansion of the energized, temporary networks which gradually evolved (and subsequently had to be de-energized toward the end of the PG&E outage).

Following a comprehensive engineering analysis, PG&E developed a method of raising the temporary cables. This work, planned for and accomplished in early January 1983, during a scheduled 12-hour power outage, resulted in a Navy Channel minimum clearance of 154 ft. above MLLW.

As it was necessary for PG&E to place the relocated, raised cables directly over the site for the future permanent tower which will be built during the summer of 1983, Mare Island will have to plan for another scheduled power outage.

Post Outage Initiatives

The rapid response actions during this massive and extensive power outage resulted in expeditiously establishing temporary power service throughout the Mare Island Complex. During and following the outage, a number of initiatives were identified toward further enhancing response capabilities, should a similar need arise in the future:

- Develop complete inventory of Mare Island portable generators and locations; maintain ready-access name and telephone listing of points of contact necessary for quick retrieval of equipment. Ensure all such generators are in regular preventive maintenance programs.
- Develop and maintain ready access name and telephone listing of points of contact at other military activities and commercial rental agencies for procuring portable generators.
- Identify/update electric load demands for each building on Mare Island Complex.
- Expand and maintain priority load listing for Mare Island Complex
- Identify and maintain listing of most practical tie-in points for portable generators (including exact location).
- Assess need for additional permanently installed emergency generators or tie-in points for quick connection of portable power.
- Establish and maintain dedicated emergency supplies/equipment: lanterns, extension cords, small portable generators, light plants, fuel containers, etc. Establish associated dedicated storage area, accountability and maintenance plan.
- Determine and document crew sizes and supervisors (Public Works Department) required for massive interim power restoration. Identify and implement any special training/drills required.
- Assess effectiveness and design of Shipyard radio antenna repeater system relative to portable radio operation, as some areas on Mare Island were not reachable by portable radio.
- Develop method for making telephone system more functional during electric power outage (numerous phones could not ring or light up after loss of building power).

Summary

Throughout and following this entire outage and restoration effort, it became clear that there is no universal preplanned, step-by-step procedure which can be relied on to carry an activity through all such possible complex events. The key to minimizing the adverse impacts of unexpected major disruptions to utilities system lies in having built-in redundancies in the various systems, command and control procedures, ready-to-use documentation and knowledge of all existing utility systems and available equipment, ready-to-use documentation on priorities for services, and experienced and resourceful people who can deal with adversity. □

speaking from topside

departments

Needed:

leaders for the eighties

One of the most interesting aspects of my recent experience as Commander of the Atlantic Fleet Seabees was the opportunity to witness, first hand, the varying abilities, styles, and results of the commanding officers of our Fleet operating units. Each of these commanding officers had been hand-picked based on his total record of performance, his service reputation, his prior Seabee experience, and his potential for succeeding as a C.O. All are superb engineers and all clearly have made their mark as managers. Needless to say, each is a highly competent professional, with strong credentials for command.

To me, the element that made ***standout*** commanding officers is their "leadership." This observation has reinforced, for me, a career-long belief that the ability and willingness to lead are vital to a Civil Engineer Corps officer, no matter where he or she is serving.

Our Three Professional Roles

I have heard several of our Chiefs of Civil Engineers emphasize the point that we in the Corps are, above all, naval officers — then engineers and managers. Clearly, we CEC officers are professional engineers or architects and we do a most credible job managing the vast resources in the Navy's shore establishment, but the fact that we are commissioned naval officers distinguishes us from others with similar technical experience and training. As naval officers, we are expected "to lead." We are responsible for the leadership of NAVFAC, the Naval Construction Force, and the Corps.

I reflect often on our triad of roles, and I agree that our responsibility to lead — to be competent, effective naval officers — remains foremost. This is increasingly vital today as we approach the mid-1980s — a dynamic period of obvious technological and sociological change, in which a growing Navy will place further demands on all of us.

In no way do I wish to minimize the importance of our other professional responsibilities as engineers and managers. All of our decisions and advice must be based on sound, logical engineering principles. It is our professional responsibility that the engineering considerations be fully evaluated and considered in all of the Navy's decisions regarding planning, design, construction and maintenance of its shore establishment.

For example, the risks of reducing quality to conserve scarce construction dollars must be carefully evaluated based upon your engineering expertise and candidly presented to the decision makers. Engineering decisions require the very best in analysis, and compromise at the expense of reliability and function is not to be tolerated. The continuing emphasis on professional registration for CEC officers highlights this concern for technical competence.

As managers, CEC officers constantly must use good judgment and sound logic in applying the optimum amount of resources — dollars and people — to solve the myriad challenges of operating and maintaining the Navy's installations. Inspections, scheduling, levels of maintenance, backlog, POM, budget, energy conservation, most efficient organization, and "contract vs. in-house" are not merely "buzz words." They are representative of the activities, decisions and challenges that public works managers face each day.

We as CEC officers must rely on our professional training, common sense, professional intuition and experience to give our commanding officers and base commanders the very best management advice as they fight for an appropriate share of the

limited resources available and then allocate them to accomplish their mission.

Leaders or Managers?

To some, there is no difference between a good leader and a good manager. I believe that not all successful managers are good leaders — and not all outstanding leaders are necessarily the most competent managers. The differences are often shades of gray, largely made up of intangibles. While the distinction may be difficult to define, a true leader characteristically stands out in the crowd.

These are some of my own personal observations on leaders: They inspire people to excellence — to achieve the "nth" degree of performance if necessary; most effective leaders I know possess a charisma and a special ability to communicate with other people; a leader not only knows what's right, he or she has the courage and moxie to take charge and "make it happen"; a leader listens and is appropriately flexible, or demanding, depending on circumstances; a leader will appropriately challenge the status quo, and win over all concerned to his or her positions; a leader is one whom others instinctively and eagerly follow. While there are literally hundreds of schools to train

Continue on page 11

Investigating the minor military offense – Part II

Continued from Summer Issue 1983

The PIO should always question the witness regarding knowledge of other witnesses which may materially contribute to the matter under review. All such individuals should be interviewed by the PIO. Additionally, the PIO must remember to interview the person who has complained of the criminal action. This individual may be a victim. Reviewing the matter with the complainant may draw out more working facts when passions have cooled.

The witness also should be questioned as to future availability, since the military justice process is defeated if the "star" witness leaves unannounced for Diego Garcia when the controversy arises in Port Hueneme, California. The PIO must flag the availability issue in the report and put the command on notice of any problem.

One source of contention in the interviewing of witnesses is whether they must receive Article 31 warnings about their right to remain silent, etc. Insofar as the witness is not suspected of an offense, there is no obligation to give the rights. The better and recommended practice is to first provide the Article 31 warnings.

Sometimes it becomes apparent that the witness is about to make an incriminating statement but more often the inculpating words are just blurted out. Should the matter be subsequently referred to court-martial, a taint which cannot be purged may result.

If the PIO sees a situation where it is apparent the witness is going to make unbridled admissions and no Article 31 warning has been given, the interview must be stopped immediately, and the necessary warnings administered before proceeding.

To facilitate providing the Article 31 rights, the PIO may wish to utilize a written form which identifies the rights and waives the rights individually, requiring the suspect to initial after each, sign, and date. This document would then be valuable to retain and append to the completed investigation.

Cumulative statements or testimony are also of concern to the thorough investigator. Generally, with the exception noted below, cumulative statements which reveal that fifty witnesses all saw the same thing should not be collected.

One or two such statements will suffice in lieu of fifty. If, however, the evidence is controverted, e.g., one group relates the barracks thief was a tall male Equipment Operator, while the other group posits that she was a short Construction Electrician, the PIO should proceed to recover as many witness statements as can exist. Hopefully, somewhere in the collection of statements, the PIO will bump into the truth or provide the command with sound judgmental criteria.

In passing, it should be emphasized that the PIO needs to secure any available witness statement corroborating a confession of guilt by the accused. Experience regrettably has revealed the propensity of some to confess to crimes they never committed or which never even occurred. In the event the case is referred to a court-martial, bolstering or corroborating a confession is crucial.

Finally, all witnesses must be listed on the Report and Disposition of Offenses form. The rank/rate and division/department are requested on the form and save time locating individuals especially in large commands.

Examining the Accused

The PIO should wait until all other evidence has been collected before interviewing the accused. At the beginning of the interview, the unvarying procedure is to advise the individual of his rights under Article 31. The accused also must be reminded that failure to make a statement does not result in any penalty. Should the accused be unwilling to discuss the facts, the PIO must promptly terminate the interview.

Next, the accused can be advised as to the general nature of the inquiry. The PIO may wish to explain that an adverse determination may lead to referral of the case to a mast or court-martial. Care must be taken not to coerce the accused or create an undesirable situation of duress in which he feels compelled to make a statement. This educational process must never be used as a threat. Optimally, the PIO will simply relate the punishments available or typically awarded.

During the interview it may become obvious to the PIO that the accused is not mentally responsible or coherent. If apparent to the PIO, that condition should be communicated to the command. It is permissible for the PIO to opine as to the source or extent of the accused's mental problems.

Further, the interview may reveal asserted defenses to the alleged misconduct. In such cases, it would be inappropriate for the PIO to comment upon and discuss the validity of the defenses with the accused since that type of judgment is properly rendered at mast or court-martial.

Rather, the anticipated defense if tendered should be logged with appropriate comment in the investigatory report. Suggesting to an accused that his defense sounds implausible frequently results in a more sensible, remanufactured alibi.

Finally, the PIO must review all of the evidence and determine whether it supports the charges under investigation. A comment on this ultimate fact is always appropriate. If the evidence clearly indicates the innocence of the accused, that conclusion must be made a prominent feature of the report.

Recommendations

After all the evidence is in, the PIO should make a recommendation. All

available witnesses have been interviewed, physical and documentary evidence has been recovered and examined, and the accused afforded an opportunity to comment.

If the PIO believes the accused did the act complained of, an independent investigation or interview should be made to develop any extenuating circumstances. Separate and distinct from defenses, matters in extenuation or mitigation are those which might have some bearing on how the case should be handled and what the authority handling the action should consider in favor of the accused

Examples of such matters might be conditions which existed when a recruit entered the military, previous disciplinary problems and their alleged source, civilian convictions, and explanations proffered by others as the basis for the offense. The foregoing would be routinely logged at the conclusion of the report.

Simultaneously with the investigation of apparent misconduct by the accused, the PIO will examine whether the complained of deeds constitute an offense under the UCMJ. Some allegations may seem illegal and sound like offenses under the UCMJ, but upon examination the Code may not cover such a charge.

The professional way to uncover the elements of an offense is to utilize the *MCM* effectively. A judge advocate may be consulted for assistance, but the *MCM* is not beyond the ken of most assigned investigators. Following each punitive article is a layman's discussion of what constitutes the offense. Following the discussion are the elements of proof which are succinct statements necessary to establish criminality.

A comprehensive investigation will allow clear evaluation of the elements vis-a-vis the evidence. If the evidence is close, the investigation has merit as the final determination will not be made by the PIO.

Rather, the PIO may note in the report that the elements are either present or lacking, and if lacking, which ones are apparently not established. On the other hand, if the wrong charge has been levied, the PIO must recite that conclusion.

At this juncture, the PIO should solicit one final source of valuable input for higher authorities to consider. This solicitation is not only suggested, the report chit provides a space for this information. The accused's division officer should be interviewed regarding the character, work, performance of duties, and value to the military of the accused. This officer should not be asked to discuss the merits of the case since the "remarks" section does not seek such comments.

Instead, the division officer should give a contemporary performance evaluation. In some instances, the PIO and the division officer are one and the same. This fact should be stated in the report to indicate that in conducting the investigation the PIO was not perhaps 100% impartial despite best efforts.

The foregoing procedures may result in collection of a remarkable quantity of information. Noting that the Report And Disposition of Offense(s) form has a relatively small space for comments, the PIO could attach extra pages. Additionally, the PIO's comments might include revelation of technical problems with the investigation such as missing evidence or non-availability of witnesses.

If an obvious punishment is suggested by the facts of the report, a specific recommendation can be added. This will be preparatory to initiating the final act as a PIO. The report form requires a recommendation as to disposition: "dispose of case at mast"; "refer to court-martial"; "no punitive action necessary or desirable"; and "other."

An impartial recommendation made in good conscience based upon a thorough, professional investigation will logically follow.

Conclusion

Attention to detail in the discharge of one's professional duties as a PIO will promote the good order and discipline necessary to accomplish the demanding mission of today's Navy.

The guidelines presented in this article should foster the administration of military justice thereby contributing to improved morale and increased military readiness throughout all components of the Seabees, the Civil Engineer Corps, and the Naval Facilities Engineering Command. □

Speaking from topside

(Continued from page 9)

managers, I'm convinced that leaders "happen" and are developed through experience and exposure.

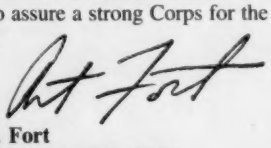
The Challenge

At the outset, I cited the Seabee context in singling out leadership as the pivotal element of success. While the impact of leadership may be more readily and clearly defined in that rather regimented operational environment, there is a need for leadership in all aspects of the Civil Engineer Corps. The challenge to "do more with less" in Public Works staffs while we contract out more and more work effort requires innovative and positive leadership to see that the services we provide and functions performed will continue to be excellent.

In a day and age where shoddy workmanship and cutting corners are more and more prevalent, it is incumbent on our ROICCs to seek the best from their staffs and contractors, to avoid the trap of the lowest common denominator in quality. Officers on major claimant staffs and in Washington must constantly seek to challenge the system to find a better, more efficient way to support the Fleet.

Each of us personally must seek excellence in all that we do, and must challenge and guide those around us to the same high standards of performance and accomplishment that have earned Navy Civil Engineers a reputation for excellence throughout our history.

The Civil Engineer Corps' strong professional heritage is founded on the principles of naval leadership and technical competence. There is no time like now to find the leader in **you**, to assure a strong Corps for the future.



A. W. Fort
Commodore, CEC, USN
Director of Construction

The Family Housing Management Institute

Where students see the good and the bad

By STEVE KEATING
Housing Management Specialist
NAVFAC HQ

• Alexandria, Va.

Imagine that you have the responsibility to inspect construction work being done on Navy family housing. This particular contract is for total renovation, and the contractor has advised that the facility is ready to be turned over to the Navy.

During the final inspection, the first thing you notice about this particular house is that it has been improperly painted. The surface was totally unprepared for painting in that it was wet and unprimed. That's only for starters.

You find that the vinyl asbestos tiles have been weighted down with too much adhesive and the joints are poorly aligned as well.

In the kitchen, when you open the refrigerator, the door hits the wall before it can be fully opened.

You're not finished yet.

The mechanical system has been poorly planned and is obviously rife with examples of poor workmanship. Pipe joints are loose. Piping is uninsulated where it runs through the attic. The water heater is located in a spot where no service person will ever be able to get at it easily. The electrical wiring is improperly sized for the load it's intended to carry.

UVA coordinator Kline Harrison (left) demonstrates screen door feature to students while Bob Sykes (right) watches.

The list goes on. What do you do? You're fully aware of what the specifications call for. Accordingly, you accept the unit with pleasure, fully satisfied that the contractor has done what he was supposed to do.

The above may seem like an inspector's nightmare or an instance of sloppy specification writing, but it was a reality at the Naval Air Station, Jacksonville. The unit in question is one of the laboratories at the newly-constructed, and recently dedicated, Family Housing Management Institute (FHMI) facility.

The origin of the FHMI can be traced to the Family Housing Management School established by the Department of Defense in the mid-1960's. The school, which was located in Washington, D.C., and was staffed by volunteers, was phased out in the early 1970's due to budgetary cutbacks.

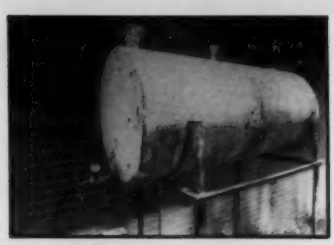
Unlike the Navy, the Army and the Air Force carried on this training for housing management personnel within their own established training programs. The Navy did not immediately fill the void left by the departure of the DoD school.

The need for this training did not go unrecognized by the Navy, however. In 1979, NAVFACENGCOM developed a curriculum and outline for an educational program which would provide instruction to a student population consisting of people at a variety of grade levels and representing all levels of the housing chain of command (Activity - Engineering Field Division - NAVFAC Headquarters).

It was determined that the best way to ensure effective instruction would be to make use of professional educators, and a Request for Proposal was subse-

Lab A – "Poorer" house.

Kitchen in Lab A.



Fuel tank behind Lab A.

Lab B – "Better" house.

Kitchen in Lab B.

Heat pump in Lab B.

quently issued for contract development and presentation of the FHMI.

The University of Virginia was selected through the competitive bidding process to be the one to accomplish this undertaking and to make a pilot presentation of a two-week overview course of Navy family housing management.

At the same time, there was a search for a location which would serve as a home base for this new training program. NAS Jacksonvillie was chosen from several locations because of its ability to satisfy logistical and billeting requirements associated with such an undertaking, not to mention its favorable year-round climate.

The pilot presentation was successful and in 1980 the University of Virginia began to present scheduled two-week sessions of the FHMI. These sessions are in full swing today and are attended by Navy and Marine Corps personnel representing all echelons of command.

The staff of instructors at the FHMI is comprised of faculty members of the University of Virginia. They are complemented by a resource staff consisting of housing management specialists from NAVFAC headquarters and the EFD's.

The resource staff is on hand during the sessions to address specific operating matters when they arise and to assist the students in their exercises.

Since the completion of the pilot presentation, approximately 600 students have successfully completed the course and there are about 600 more students waiting to attend.

Although attendance has been primarily by family housing management staffs, other public works personnel, including public works officers, assistant public works officers, resident officers in charge of construction (ROICC's), and planners and estimators have attended.

The early sessions at NAS Jacksonville were nomadic, using any available space for a classroom. Frequently, the enormous Ward Room of the Unaccompanied Officer Personnel Housing building served this purpose. Although it filled the bill in the pinch, it was not overly conducive to the training and educational environment that was being sought.

A modern training facility with two accompanying laboratories was envisioned by NAVFAC as a permanent home for the FHMI.

The classroom itself had to be large enough to provide space for the full class to meet for both the daily lectures and seminars as well as space for each group within a particular class to work on daily assignments and long-range projects while in a "housing office mode."

While in this mode, the groups operate under a simulated housing office environment, which is replete with situations that are likely to occur during a routine day at any field activity.

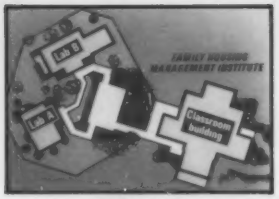
There was also a desire to have a vehicle to demonstrate to students some of the ideas and concepts they were learning in the lectures.

The use of laboratories was chosen as this vehicle. Aspects of the design and construction of housing units would be depicted in order to familiarize students with those things that they would be likely to find in the housing inventory at their own activity.

Fortunately, NAS Jacksonville already had 19 inadequate family housing units which were slated for disposal. Two of these units were selected for use as the FHMI laboratories.

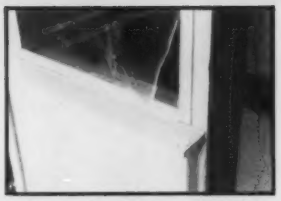
The first step was to relocate the two units to the site selected for the new facility. Plans were drawn up to downgrade one of the units and to upgrade the other once they were moved.

Great care was exercised throughout the design process to ensure that representative types of discrepan-



FHMI logo.

Cut-away in Lab A showing construction technique.



Poor screening – Lab A.

Eight different kinds of windows displayed in Lab B.

Top view of classroom.

Students discuss issues with Director Charlie Straley (center) and Kline Harrison, Coordinator (right).

Kline Harrison, Coordinator, and Bob Sykes, NAVFAC Resource person (right), demonstrate dishwasher.

The Labs as seen through the patio.

cies were built-in, to exemplify those features which are unacceptable to the Navy.

One would depict nightmarish construction and maintenance effects while the other would portray a housing unit which features good construction and maintenance.

The laboratories are, perhaps, the single most unique feaure of the FHMI. They are the first of their kind in either the public or private sector insofar as the training of professional housing managers is concerned.

The intent for the laboratories is that they will provide students with a "hands-on" experience in viewing both the good and the bad with respect to construction and maintenance workmanship.

They also display a variety of construction materials, building components, and finishes to help the housing manager become more conversant with the many technical aspects of a housing unit.

The facility and associated labs are now complete and have been occupied since the conduct of the March 1983 FHMI class. These labs were identified as 'Lab A" and "Lab B." They could be characterized as symbolizing "awful" and "better," respectively.

Because the labs are intended to display varieties of construction materials and techniques, they are not typical housing units. For example, in entering either Lab A or B, one is confronted with a choice of several screen doors and front doors to walk through.

The purpose is not to confuse but to allow for a comparison of the different types of doors commonly found in housing units, and more importantly to engender discussion relative to the positive and negative features of each, as relates to different housing in different locations.

Exteriors of the units are a combination of different materials. One unit alone features plywood siding, aluminum siding, shiplap siding, stucco, and brick veneer as exterior surfaces.

Extensive use is made of cutaways and plexiglass walls to allow one to examine components that are not usually seen, such as electrical wiring, plumbing, or floor joists.

A climb up the stairs into the attic spaces will reveal myriad insulation materials. The FHMI instructor is able to point out their identities and the relative advantages or disadvantages of each, with special references to cost, durability, energy efficiency, and occupant satisfaction.

The training facility and Lab B also feature some energy conservation applications. The four exterior walls of the classroom are surrounded by an earth berm which serves as insulation against not only the exterior temperature but also the sound of overhead aircraft. Lab B contains a solar domestic hot water heating system as an illustrative example of just how such a system works.

A self-guided walking tour is currently being developed for the FHMI labs. A visitor will be able to pick up a portable cassette tape player and a pre-recorded tape and follow a designated route through the labs.

The taped pitch will direct one's attention to the details and examples that are offered by the labs.

In addition, signs will be installed throughout the interiors and exteriors of the labs to point out technical characteristics which are common to Navy family housing.

The welfare of the Navy family forms the nucleus and the goal of any family housing training endeavor. As such, the overall objective of the FHMI is best summed up in its motto: "Enter to Learn—Leave to Serve." The ultimate success of the FHMI will be measured by the satisfaction of our tenants - the Navy family. □

situation report

departments

ASSISTANT COMMANDER FOR OCEAN FACILITIES - In recognition of NAVFAC's permanent responsibility and expanding role in design, construction, inspection, and maintenance of ocean facilities, the Office of the Assistant Commander for Ocean Facilities (FAC-07) has been established and the Director of the Ocean Facilities Program Office (PC-2) is disestablished effective 1 October 1983. The Assistant Commander for Ocean Facilities will be responsible for the planning, developing, evaluating, coordinating and utilization of NAVFAC's capability to support Navy requirements in the acquisition, maintenance and repair of fixed ocean and hyperbaric facilities. The Ocean Facilities Program will continue and be managed by FAC-07. Navy ocean facilities include offshore air-combat training ranges, fleet underwater acoustic tracking and weapons training ranges, degaussing and deperming facilities, offshore pipelines and sewer outfalls, power and communication cables, specialized moorings and hyperbaric facilities.

(NAVFAC Code PC-2)

SEABEES IN HONDURAS - In mid-August 100 Seabees of NMCB-74's Detachment Alpha Tango deployed to the Central American country of Honduras. While in Honduras the Seabees will provide support for JCS Exercise AHUAS TARA II by constructing camp facilities to accommodate participating troops, extend an existing airfield, and possibly Civil Action related projects such as water well drilling. The detachment sailed from Gulfport, Miss., aboard the SS Mason Lykes with some 1100 items of general cargo totaling over 2.4 million pounds (143,000 cubic feet). An extensive effort by personnel of COMCBLANT, Construction Battalion Center, 20th Naval Construction Regiment, COMCBLANT Detachment Gulfport and NMCB-74 was required to mount out the detachment in the short timeframe required.

(NAVFAC Code 063)

BEST - A major milestone was reached in the Base Engineering Support, Technical (BEST) project with the September award of a contract for 175 minicomputer systems. The BEST project, funded as a Productivity Enhancing Capital Investment project, will provide standard software and hardware to about eighty Navy Public Works Departments. BEST includes subsystems supporting Maintenance Control, Transportation, Utilities and Family Housing. The system will be tested at CBC Port Hueneme and NAS Miramar during 1984. Installation at the first PWDs will start about 1 October 1984.

(NAVFAC Code 10)

The coldest plac

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Antar

By LCDR G. R. Henderson
CEC, USN
P.E., Mo.
and
LT C. M. Dayton, CEC, US
E. I. T., Calif.

• Port Hueneme, Calif

The ancient Greeks theorized that a large land mass to the south existed to balance the continents in the north. Since the Greeks had named the area to the north, Arctica, the area to the south would logically follow as Antarctica. The ancient Greeks knew nothing of Antarctica, and even today little is known of the great white continent in comparison to its size and potential.

We do know that Antarctica is the coldest place on earth, with a record low of -128.6°F measured, July 1983, at the Soviet station, Vostok. Antarctica has an area of 5.5 million square miles, making it larger than the United States and Mexico combined. It is the highest continent, with an average elevation of 6,000 feet, and is 98% covered by ice, which at the thickest point measures 2.8 miles deep.

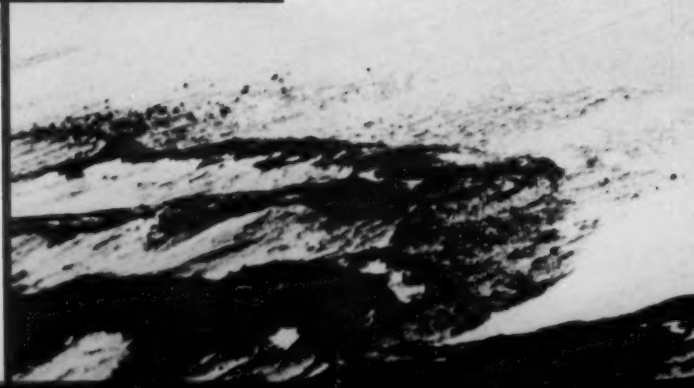
Nearly 90% of the earth's fresh water is accumulated in Antarctica with an estimated 7.2 million cubic miles of ice. Yet, Antarctica is for the most part a desert, averaging less than one inch (water equivalent) precipitation at the South Pole.

Antarctica is varied in its geographic features. Its many mountains include the Ellsworth Mountains near Siple Station with the highest peak, Vinson Massif, at 16,860 feet. Its active volcano, Mount Erebus, which is one of only two volcanos in the world with a continuous molten pool of lava, the only other volcano of its kind is located in Africa.

Antarctica has a series of dry valleys adjacent to McMurdo Sound. In these areas the continent is free of ice and snow year round. In 1968, Dr. Wernher Von Braun visited the dry valleys in search of a lunar-like training site. Later that year, biologists from the Jet Propulsion Laboratory came to study the microscopic forms of life found on the valley floor in hopes of learning how to detect life on Mars.

Antarctica has vast ice shelves, some hundreds of feet and more in thickness, the largest of these is the Ross Ice Shelf which has a surface area equal to that of France.

Of all the features mentioned, the most dominant feature is the Polar Plateau, that vast expanse of ice covering the interior of the continent. It is the Polar Plateau which affects the weather throughout the southern hemisphere and thus the world. As a result of the extreme cold temperatures and high



THE BIG PICTURE – Mt. Erebus, Ross Island, Antarctica. ABOVE – Public Works Personnel erect a 40 X 100-foot pre-engineering building and a cold storage warehouse.

ace on earth . . .

The
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elevations over the Polar Plateau, katabatic, (gravity driven) winds, can reach speeds up to 200 miles per hour along the Antarctica coast.

Seabee History in Antarctica

The Seabees have been working since 1947 under conditions of extreme cold, wind, and continuous darkness or sunlight. The first Seabees arrived in Antarctica as an integral part of Operation High Jump, Task Force 68. The Seabee unit consisted of five officers and 166 men who departed Port Hueneme in December 1946 to join RADM Byrd and nearly 4,700 other men participating in the largest expedition ever sent to Antarctica.

During this operation, the Seabees constructed temporary facilities at McMurdo Station on Ross Island and at Little America IV on the Ross Island shelf. Seabees also performed extensive equipment operations in moving the vast quantities of supplies ashore.

ABOVE – A tractor train negotiating a pressure ridge enroute to Marble Point. INSET – An emperor penguin pauses to take a look.

Upon completion of Operation High Jump, the Seabees did not return to Antarctica until 1955 when, the Department of Defense was tasked to furnish logistic support for the International Geophysical Year (IGY), which was to begin on July 1, 1957.

The IGY was a cooperative program of scientific observations that extended from July 1, 1957 to December 31, 1958. Scientists from over 60 nations participated in this worldwide effort. Twelve of these countries conducted active programs in Antarctica: Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, the U.S.S.R., the United Kingdom and the United States.

In February 1955, a Mobile Construction Battalion (SPECIAL), was formed at Davisville, Rhode Island. With the technical assistance of the Naval Facilities Engineering Command, plans were made for construction and maintenane of the Antarctic stations. →

The National Science Foundation Headquarters at McMurdo Station flies the flags of several countries.

A utilitiesman repairs a fresh-water line at McMurdo Station.

The first deployment to Antarctica, known as Deep Freeze I (1955), called for the establishment of two stations to be located at Little America V and at McMurdo Station. Personnel of Naval Mobile Construction Battalion (NMCB) (SPECIAL) wintered over at these two stations in preparation for the establishment of the Byrd and Pole Stations during Deep Freeze II (1956-57).

By the start of the International Geophysical Year, the Seabees had the necessary facilities ready at all four sites. The program had progressed to a point which changed the function of NMCB (SPECIAL), to that of station maintenance.

Deep Freeze IV marked the end of the Antarctic IGY program and the closing of the bases. Because of the successful Antarctic program during the IGY, scientists and their sponsoring governments desired to make it permanent.

An outgrowth of the IGY was the Antarctic Treaty of 1959. The governments which participated in the IGY agreed that Antarctica should be used for peaceful purposes only, and that all territorial claims would be suspended as the treaty went into effect on June 23, 1961.

While the treaty bans military bases, military maneuvers, weapons testing, nuclear explosions, and the disposal of radioactive waste, the treaty does permit the use of military personnel and equipment to support activities of a peaceful nature.

In 1959, Naval Support Force Units, Antarctica was disestablished and Antarctic Support Activities, based at McMurdo Station, was established in its place. During this same year, Antarctic Support Activities, Detachment ALFA was formed at Davisville, Rhode Island.

Henceforth, Deep Freeze operations were named to coincide with the fiscal year. Operation Deep Freeze '60 saw much renovation of old facilities and construction of several new ones. Deep Freeze '61 saw the first full-strength construction battalion, deploy as a unit, since NMCB (SPECIAL). During Deep Freeze '61, the Seabees of NMCB-ONE constructed a nuclear power plant at McMurdo Station. Deep Freeze '62 saw the completion of the nuclear power plant; it delivered its first power to the base on July 10, 1962.

During the summer operating season of Deep Freeze '65, NMCB-6 constructed a new station on Anvers Island above the Antarctic Circle, off the coast of the Palmer Peninsula. Personnel from Antarctic Support Activities subsequently manned the new Palmer station. NMCB-6 also built the first major road in Antarctic that year, greatly aiding the unloading of cargo ships resupplying the Antarctic facilities. Also during Deep Freeze '65, NMCB-6 started on a new, modern medical dispensary at McMurdo, and a new generator and a water distillation plant.

Deep Freeze '67 saw a new Seabee unit join the Naval Support Force, Antarctica (Antarctic Support Activities' new designation).

On June 1, 1966, a special Seabee unit, Construction Battalion Unit (CBU) 201, was established in Davisville to specialize in construction for Antarctica.

During Deep Freeze '69, a considerable amount of construction was accomplished by CBU-201, then in its third consecutive year in the Antarctic.

During Deep Freeze '70, new construction included the administration building for the National Science Foundation, sponsors of the U.S. Antarctic Research Program (USARP). Construction efforts included two fuel storage tanks with a combined capacity of 2.5 million gallons and an unheated warehouse, along with a 180-man mobile quarters complex at Williams Field, an airfield located on the Ross Ice Shelf a few miles from McMurdo Station.

During the Deep Freeze '71, CBU-201 began construction on the new South Pole Station.

Major projects undertaken during Deep Freeze '72 included further work on the new South Pole Station, a new station at Siple and several large projects at McMurdo Station to enhance the livability of the Station. Construction continued on the new South Pole Station and on February 7, 1974, the battalion completed and turned the station over to the Naval Support Force, Antarctica (NSFA), and the National Science Foundation. Deep Freeze '74 was the final year that naval construction force personnel participated at unit strength in Deep Freeze construction.

Since that time, Deep Freeze '75, all major construction work for the Naval Support Force and the National Science Foundation have been performed by contract. The remaining naval construction force personnel were assigned to the Public Works Department of NSFA.

A dome structure housing the main facilities at the South Pole Station.

Supply ship USNS Southern Cross stands along side the ice wharf during ship off-load operations.

The almost total shutdown of the Construction Battalion Center (CBC) at Davisville, Rhode Island, in 1975 compelled the transfer of NSFA to its present homeport, CBC, Port Hueneme, California.

Despite the fact that the Naval Construction Force Units were phased out, the Naval Facilities Engineering Command still remained active in support of Deep Freeze operations through the Naval Civil Engineering Laboratory (NCEL).

NCEL designed the ice wharf used at McMurdo Station. The first of three ice wharfs used to date was constructed at McMurdo Station during Deep Freeze '76 by NSFA winter-over personnel.

The Ice Runway prepared annually during WINFLY operations, late August through early October, was first monitored by NCEL personnel in 1961.

Antarctica Today

Antarctica of the present is little changed from its recent past. Today, four U.S. stations remain operational year round; South Pole, McMurdo, Palmer, and Siple. Byrd Surface Camp is operational for the summer season only. At the conclusion of current Deep Freeze '84, Byrd and Siple Stations will be closed for two years.

McMurdo Station today is the main base of operation for the United States Antarctic Program. The McMurdo areas was originally selected by Captain Robert Falcon Scott of the British Navy in 1902 as a camp site because of its protected deep harbor, Winter Quarters Bay, and its location near the South Pole. In 1955 the U.S. selected McMurdo because of its central location to the outlying stations, its natural harbor and access to the Ross Ice Shelf, for airfield support.

Located on Ross Island at 77°-51' south latitude, McMurdo is the southern most point that can be reached by ships even with the aid of ice breaker support. The station consists of 95 structures including a diesel power plant, a water distillation plant, various labs, an aquarium, helo maintenance facilities, an 800K-gallon fuel farm, and berthing spaces for a summer population which peaks at approximately 1,200.

To support air operations at McMurdo, two runway systems have been constructed. One is located on annual sea ice, and another at Williams Field, located on the Ross Ice Shelf. With the ability to be resupplied by both ship and air, McMurdo Station is the staging and supply point for South Pole station, Siple Station, and various summer field camps.

The United States Antarctic Program is conducted under the auspices of the National Science Foundation.

Direct support of the Antarctic Program also includes a CEC, PWO billet at Christchurch, New Zealand. On permanent assignment in New Zealand, the PWO is responsible for berthing, supply and aircraft support facilities that are leased from the New Zealand government, and used to support transiting personnel to the ice and air resupply operations. leased from the New Zealand government, and used to support transitting personnel to the ice and air resupply operations.

Antarctica today holds many challenges in the construction and maintenance of facilities. Many of the challenges are the same as those facing any public works officer, maintaining effective preventive maintenance, limited budget, unlimited customer requests, and manpower constraints.

To these normal problems, one must add the complications of a short summer season (Oct-Feb); when weather and light permit most work and resupply efforts; a work force which deploys; a personnel turnover rate of over 33% per year; continuous cold weather conditions; planning for a mid-winter airdrop; and planning and execution of a Winter Fly-In (WINFLY).

Standard facilities, such as runways, take on new meanings in the Antarctic. The annual ice runway is constructed on new sea ice each season to support wheeled aircraft operations, including U.S. Air Force C-141 Starlifters during the high-tempo air cargo and passenger period of October through mid-December.

In late August, when the sun has only just begun to shine and the temperatures remain "winter cold," a winter fly-in is conducted. Nicknamed "WINFLY," the winter-over crew is augmented with personnel utilizing ski-equipped C-130 aircraft, operated by Antarctic Development Squadron-Six. Their task is to help in preparing the station for season opening, and to construct the sea-ice runway for air operations. Warmer temperatures in late December preclude its use as the ice warms and loses strength. When operations on the ice runway become impossible air operations are moved to the snow runway.

The snow runway, constructed of compacted snow, is located on the Ross Ice Shelf and is used for ski-equipped C-130's during the summer season. Snow and ice are not only unique runway construction materials, but they also continually move. As the Ross Ice Shelf moves seaward at a rate of three to four hundred feet per year, so does the airfield. This requires annual resurveying to correctly relocate air navigation aids, and continual maintenance of the ice to land transitions.

The wharf facility constructed in Winter Quarters Bay, directly below McMurdo Station, is a unique ice structure. It is a "Seabee-made" iceberg, constructed by pumping sea

water on top of existing ice in thin layers in successive lifts. The resultant "ice cube" grows to become as thick as 20 feet before it is used as a floating wharf for ship off-load operations.

The ice-wharf must be constructed during the winter-over periods when temperatures are low enough to rapidly freeze the sea water. History of the ice wharf indicates a service life of three to five years before ice pressure, tides, and ship off-load operations cause its deterioration and it must be towed to sea by a Coast Guard Ice Breaker.

"Antarctic Concrete" is a readily available construction material. A simple mixture of soil and water, which, when frozen, develops high sheer strengths. Below a depth of approximately 18 inches, the volcanic soil and rock in the McMurdo area remains permanently frozen. To maintain the high soil strengths, measures must be taken to keep structural supports insulated from heated spaces. In many locations, what appears to be terra-firma is actually ice-rich soil which can creep under sustained, long-term loads.

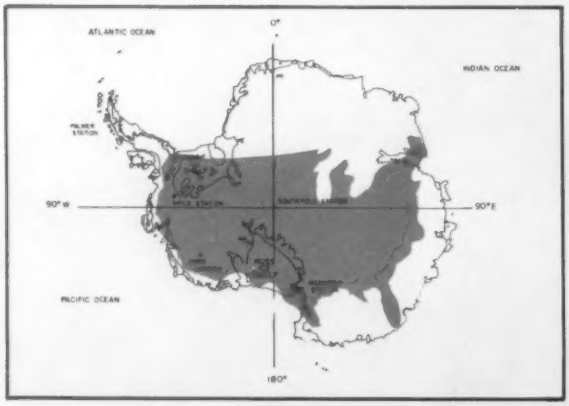
With all the snow and ice found in Antarctica, it might be expected that fresh water production and distribution is a combination of similar and unique techniques. Salt water distillation is used to provide water at McMurdo while snow melters are used at Williams Field, Byrd Surface Camp, and the South Pole Station. Distribution is through insulated and heated above-ground piping with extensive monitor and alarm systems.

The transportation operation at McMurdo Station is as unique and as different from most public works as is the maintenance of facilities. Unusual equipment such as ice chippers, low-ground-pressure vehicles, and 10- and 20-ton sleds complement the more traditional pickups, tractors and cranes found at any facility. Keeping this 300-plus fleet operating is a monumental task that requires every skill of the 15 mechanics and 30 equipment operators assigned.

The equipment operates in the worst of unfavorable conditions, extreme cold thickens oil, kills batteries, and changes the properties of steel. The volcanic dust of the McMurdo area clogs breathers, acts as an abrasive on tracks and tires, and, in general puts a real strain on equipment and the maintenance program.

Equipment operations vary from routine snow removal and transportation of people and supplies, to tractor-train traverses with dozers and sleds across annual sea ice, pressure ridges, and all of the other features of blue ice, white snow, bright sun, and adventure into the unknown.

Antarctica is larger than both the United States and Mexico combined.



A Public Works crew tests a timber bridge constructed over POL pipelines.

People, too, must work in temperatures rarely above freezing and often as low as 59° below zero. The chill created by wind blowing across human flesh can and does drop temperatures even lower. To work in that continuously cold environment, proper clothing, a knowledge of cold weather hazards, and ingenuity which only "doing it" can develop are required.

The Antarctic of tomorrow holds as many unique challenges as it has in the past. The outcome of the Antarctic Treaty review schedule for 1991 is uncertain, it may lead to exploration and political division of the continent or continued peaceful scientific co-existence between countries.

Even if 1991 does not produce a change for the Antarctic, a change will certainly come. Too many valuable resources, metallic ores, oil, coal, and abundant sea life have been identified in the vast, largely unexplored area; surely they will eventually become commercially exploited. The U.S. Space Shuttle Program is scheduled to start polar orbital flights in 1986, thus bringing the Antarctic into a position of providing communication relay and emergency landing sites for the shuttle.

As for the Navy's Civil Engineer Corps and the Seabee community, the future is somewhat clouded at this writing. The Department of Defense-National Science Foundation Memorandum of Agreement, under which the Department of Defense provides military support to the NSF, is under review and the future civilian-military mix is uncertain.

The future does, however, promise new knowledge, and new techniques for claiming the white continent. Advances in snow runway construction, fabric structures, and water production await development. Chapter after chapter of current technical knowledge ends with the statement "more research required." The challenges and research needed to engineer and construct the Antarctica of tomorrow await us today.

Regardless of the future, a tour of duty in Antarctica can provide unique, challenging and unlimited opportunities. It is a one-of-the-kind place, while at the same time being a part of the 13% of the Earth's surface which lies within the cold, dark, 60° to 90° latitudes, Antarctic duty provides training and experience which may be required at any time. Truly an environment one must experience to appreciate. □

advice of counsel

departments

By MATTHEW K. McELHANEY
Counsel
NAVFAC HQ

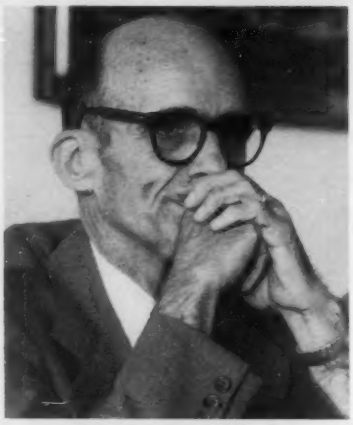
• Alexandria, Va.

"I haven't been able to get another job since." William H. Speck from a "Blueprint" interview just prior to his retirement.

This column, the NAVFAC community, and many of us personally are going to miss Bill Speck's presence. Bill joined BUDOCKS Office of Counsel in March of 1952, and for the ten years prior to his retirement, on July 31, 1983, served as Counsel for the Naval Facilities Engineering Command. During the course of these thirty-one years Bill left his imprint on many people, and, in the process established a personal reputation which uniquely qualifies Bill as a "legend in his time."

Bill has been and is still many things to many people. Bill and his Tuesday and Thursday bike rides to work stand out for some.

His disdain for sartorial impediments are memories for others. For many lawyers who worked for Bill, the memories are of a hard taskmaster who considered excellence to be the standard, so don't expect a higher rating.



William "Bill" Speck

For others, the memories center about the lawyer who wrote his pleadings, his briefs and his legal memoranda on whatever happened to be available, the back of envelopes, old papers that had only been used on one side, or whatever.

Bill might well have personally typed them on his battered old "Royal" or have written them in his stylized script.

To many of his clients he will be remembered as that very able advocate who saved the day through his professional skill and personal dedication to the NAVFAC client.

Regardless of the unique memory that calls up the name Bill Speck, all of us will remember Bill as a man dedicated to his profession, honest to a fault, totally devoted to serving his client, and a selfless man.

Bill's contributions to his profession and to the NAVFAC community are uniformly recognized and without doubt are the greatest tribute to an outstanding career.

For the future, the Office of Counsel will continue to strive for Bill's mark of excellence. Each of you should raise your expectations for your assigned counsel.

Recognize when the advice of counsel should be sought, outline your concern or ask your question, and expect advice in time to act upon it.

Counsel is a resource for every client, but of little value if not consulted. The greater is Counsel's awareness and understanding of his client's business, the more effective is the advice rendered.

Commander's Award

For Editorial Excellence

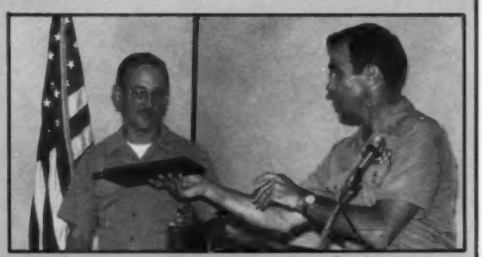
LCDR William T. Nigro, CEC, USN, Officer in Charge of Construction, NAVFAC Contracts, TRIDENT, Kings Bay, Ga., has received the Commander's Award for Editorial Excellence for his contribution to the *Navy Civil Engineer*. LCDR Nigro's article appeared in the Winter 1983 issue and was entitled "REDICHECK Promises to Minimize Waste." Presentation of the bronze award was made by CAPT James L. Wells, Deputy OICC, TRIDENT at a special awards ceremony.

Honorable Mention

★ **Mark Vogt** for "Seabees 'Wind Down' Projects on Diego Garcia" which appeared in the Spring 1982 issue.

★ **Lucy Bottomley** for "Handling Underground Fuel Oil Spills" which appeared in the Fall 1982 issue.

★ **CAPT Brian O'Connell, CEC, USN,** for "All Tied Up With Power Politics" which appeared in the Summer 1982



LCDR Nigro (left) accepts the Commander's Award for Excellence from CAPT Wells.

Nominations for the awards were made by an awards committee comprising of CAPT John L. Dettbarn, commanding officer of the Naval School, Civil Engineer Corps Officers; Les Helsdon, editor; and Judith Johnston, Public Affairs Officer, NAVFAC HQ.

1000 abandoned cylinders pose special problem at Lakehurst

By Lucy Bottomley
P.E., Wis.

An explosives expert prepares a cylinder for puncturing by making a shaped-charge explosion.

• Lakehurst, N.J.

How does one dispose of old compressed gas cylinders which may still contain compressed gases, some of them possibly dangerous?

This question confronted the Environmental/Utilities Branch of the Public Works Department, Naval Air Engineering Center (NAEC), Lakehurst, N.J. The solution that was developed could be useful to other Navy units that encounter the same problem.

A wide variety of compressed gases is used in industrial processes in the military. These gases range from the relatively inert, such as nitrogen, to the highly flammable and explosive, such as hydrogen. Apart from the nature of the contained gas, the method of storage poses a hazard; the gas is under pressure. A rupture of the container may result in an explosive fragmentation of the cylinder, propelling heavy pieces of metal in all directions, or even propelling the cylinder itself through the air like an unguided missile.

Because of this hazard, special storage and handling procedures are used for gas cylinders.

In the normal cycle of use, full cylinders are purchased, the gas is used, the empty cylinders are exchanged for full cylinders, and the cycle repeats. Sometimes the cycle breaks down and cylinders are abandoned. Contractors working aboard a base may leave cylinders behind. Military organizations undergo reorganizations, transfers of personnel, changes of mission, and reassignment of units. People can forget who is responsible for gas cylinders.

So it is that some cylinders are abandoned or turned to other uses. Lakehurst and the Navy are not unique in this respect; a general cleanup at the NAEC turned up nearly 1,000 abandoned and rusting cylinders.

The majority of the cylinders were obviously empty — the valves had been removed. Others could be tested simply by cracking open the valve. Empty cylinders posed no problem; they could be disposed of as scrap through the Defense Property Disposal Office.

Many of the cylinders, however, could not be checked so easily. Valves or valve guards were frozen in place. To compound the problem, there was no way to determine the content through markings or cylinder size or valve threading; these cylinders dated from before modern safety systems were set up for gas cylinders.

What markings there may have been were no longer readable. Lakehurst began as a Navy installation in 1920, and its long history includes the manufacture of gas by the Navy. Many of the old cylinders were probably manufactured by the Navy. It was not known, therefore, what might be in these cylinders.

State and federal regulations define such cylinders as hazardous items, and there is no question they can be dangerous. This fact was driven home during the NAEC cleanup when three such cylinders were inadvertently placed in a trash dumpster, possibly by an overly enthusiastic cleanup crew, and ended up at a nearby landfill. During trash compacting operations, one of them broke open and shot into the air, smashing the safety glass window of the trash compacting machine before arcing to the ground many yards away.

The cylinders were retrieved and returned to the NAEC. On further examination, one was found to contain hydrogen gas.

Not only had cylinders been discarded and abandoned at Lakehurst over the years, some had been set in concrete bases as traffic bumpers or barriers. The cleanup included the removal of these as well as those that had simply been abandoned. In all, more than 200 cylinders of dubious

safety — corroded, unopenable, markings unreadable — were gathered.

It is possible to set mechanics to work with wrenches and rust solvents on the rusted valves and valve guards, but this procedure is potentially dangerous. Valves could break off, releasing gas and causing injury or illness to workmen. Weakened metal could crack, releasing the contained gas with violent force. Sparks from the metal-to-metal contact of tools with container could set off fires or explosions in escaping gas. Drilling through the cylinder posed the same problem. Rupture of the container could throw shrapnel throughout the workplace.

A general cleanup at the NAEC turned up nearly 1,000 abandoned and rusting cylinders.

A safer means of opening the cylinders had to be found. As collection of the cylinders proceeded, it was considered to use explosive charges to blow holes in them, and this possibility was explored with experts from nearby demolition units. The Navy Explosive Ordnance Disposal Detachment (EOD) at Earle, N.J., agreed that the idea seemed feasible. NAEC personnel suggested an old gravel pit on the NAEC that met the required safety conditions set by the EOD: no combustible material within 500 feet and no personnel or installations within 1,800 feet.

Before proceeding, approval was obtained from the U.S. Environmental Protection Agency, the New Jersey Department of Environmental Protection, and the Northern Division of the Naval Facilities Engineering Command.

In May 1982, EOD experts rigged shaped charges to five cylinders chosen at random to test the method. Because of concern that the cylinders might fragment into shrapnel, they were buried neck down, and the charges were rigged around the cylinder bottoms. When the charges were fired, at 10-second intervals, all five blew holes in the cylinders to which they were attached.

Even from 2,000 feet away, the hiss of escaping gas could be heard following four of the five explosions. Later, when it was safe to approach the cylinders, it could be seen that the rushing gas had blown small craters in the sand. Four of the five cylinders showed this evidence that they had vented gas.

The test proved the safety of the procedure, so plans were made to detonate the remainder of the cylinders in batches of about 100 at intervals of a week between batches. Public Works Department crews dug a long trench in the gravel pit and installed the cylinders for the first large-scale firings, which took place in June. The crews also prepared a safety trench at a short distance away in case something went wrong while the EOD experts were setting the charges.

The operation of such a disposal process requires notification of the state and federal regulatory agencies and all affected base operations and personnel to avoid disruption of other necessary activities and harm to personnel. The Plan of the Day publication was used as well as phone calls and personal meetings to advise all concerned of the program.

Finally, all preparations were complete. Selected representatives of the Environmental/Utilities Branch, the U.S. Environmental Protection Agency, and the base Fire Department waited in a sheltered location under the supervision of the EOD experts as the charges were fired. The explosions punctured 97 cylinders and 11 of these showed evidence they had vented gas. (The remaining three were successfully punctured in the next set of firings.)

Cylinders are buried neck down in a trench in an abandoned gravel pit in preparation for puncturing with shaped charges.

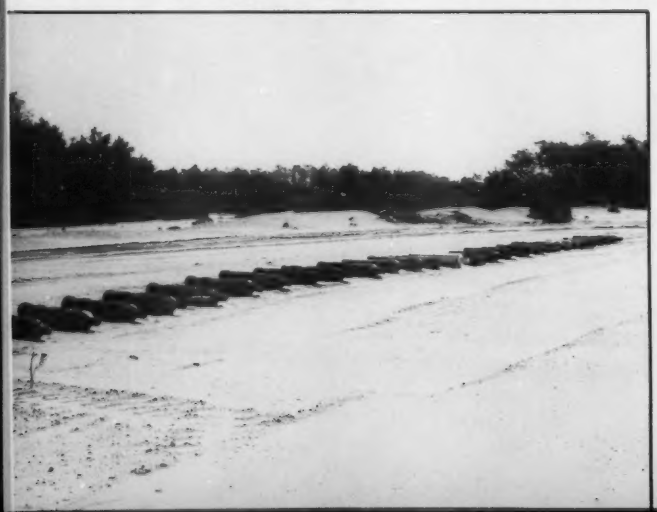
A week later, 90 more cylinders were rigged and detonated. A number of these cylinders also showed evidence they had vented gas, including two which may have contained acetylene. One of these produced a huge fireball and then burned for a few minutes; the other vented gas for an hour. Additional firings that day punctured the remaining cylinders.

In summary, more than 200 cylinders were successfully punctured by shaped-charge explosions. Many cylinders showed signs they had vented gas immediately after the explosions. This was proof that these cylinders, at least, would have been dangerous to send to a landfill or to sell as scrap.

Because valve guards and valves were rusted shut and markings were nonexistent, there was no way of knowing beforehand which cylinders were dangerous and which were benign. The demolition program removed the doubts and the dangers. The hazard to base personnel was removed without endangering trash haulers or landfill workers. In addition, the method proved the thoroughness and expertise of the members of EOD Earle.

Continued vigilance at the NAEC should ensure that no more cylinders are abandoned. However, it is a large and mostly wooded base with a long history, and more cylinders could be found.

As of this writing, 12 more cylinders have turned up and are awaiting disposal. There is now a safe, effective procedure to render them harmless. □



Some of the old gas cylinders gathered during a cleanup campaign at the Naval Air Engineering Center, Lakehurst, New Jersey, in storage awaiting disposal.

news worth reviewing

departments

School children learn about Seabees from RNMCB-16

"This is the first time someone asked me for my autograph ." . . . "So this is how a star feels," echoed the Seabees of Reserve Naval Mobile Construction Battalion 16 (RNMCB-16) as 900 children crowded around them to thank them and ask for their autographs.

And stars they were to all 900 children at Coldwater Canyon Avenue Elementary School in North Hollywood, California.

The children diligently raised funds to support curriculum enhancing programs such as specialty books and science clubs, but their dollars did not stretch far enough to build cabinets to store these books and materials. RNMCB-16 volunteered to "adopt" the school and build six large, storage cabinets.

With building materials only enough for four cabinets, parents like Carl Irwin and community participation by Ole's Home Center, teamed up to provide the additional materials so the Seabees could build all six cabinets. Carl Irwin, who has appeared in TV shows such as "Blood Feud" and "General Hospital" was also in John Wayne's last movie "Home for the Seabees," filmed at Port Hueneme, California.

Coldwater Canyon Avenue Elementary School is located in an economically, socially, and culturally deprived area but this does not stop the children's enthusiasm and deep sense of pride in their school. There is no graffiti on the walls of the school buildings and no vandalism. According to principal Charles Strole, whose son is a Navy pilot, the children work harmoniously with one another, despite the fact that 25 foreign languages are spoken at the school.

The dedication ceremony, as termed by a local TV news station, was "an event in itself." Grant High School Band, the RNMCB-16 Color Guard, Seabee balloons, and the official arrival of Rear Admiral Thomas S. Maddock, CEC, USNR-R and CDR Les Evans, CEC, USNR-R, Commanding Officer of RNMCB-16, provided color for the occasion. The PTA turned out with home-baked pastries and cakes, while Hollywood celebrities, such as Pat Morita (Arnold on "Happy Days") and Kellye Nakahara (Nurse Kellye on M*A*S*H) helped hand out balloons.

The event was highlighted by 120 children singing the Seabee Song as a final "thank you" after RADM Maddock turned the cabinets over to Dr. Othella Daniels, Region Superintendent, Region E, Los Angeles Unified School District.

Five months ago, a child at Coldwater Canyon Avenue Elementary School saw a uniformed Naval Officer visiting and asked, "Are you from the military? Are you going to bomb our school?" But through the tremendous efforts of the principal, faculty, and staff, there was no doubt in their minds what the U.S. Navy Seabees are all about. The children enthusiastically shouted "Seabees" and surrounded CDR Les Evans and the men of RNMCB-16 upon their arrival at the school.

As one child later wrote:

My class is very grateful for what you have done, so is the principal and the whole school. We also thank you for letting us sing your Seabee song. Sincerely, Madeline

Kellye Nakahara, Nurse Kelly from M*A*S*H, assists the Seabees of RNMCB-16 in presenting Seabee Balloons and Navy pencils to the students of Coldwater Canyon Elementary School.

Assistance for engineering problems 24 hours

To provide more direct person-to-person assistance to field activities, the Naval Civil Engineering Laboratory (NCEL), Port Hueneme, California, has assigned a third technology representative to a major Public Works Center (PWC).

The Laboratory's Facilities Engineering Support Office (FESO) provides assistance to the Navy's eight PWCs, seven Engineering Field Divisions, and other naval activities who want rapid solutions to engineering problems, consultation services, and the advantages of NCEL's technology transfer programs.

Peter Tafoya, head of FESO, said John Norbutas, a mechanical engineer from the Laboratory's professional staff, was selected for a six-month assignment to PWC, Hawaii. Two other NCEL engineers already are in the field, serving as liaisons between the Laboratory and various activities. They are Ed Correa, Philippine Islands, and Hal Link, Great Lakes, Illinois.

Each technology representative serves six months as promulgator of NCEL technological and professional capabilities. The representative also is responsible for the dissemination and use of Laboratory technology to many sources.

FESO provides around-the-clock assistance, at no cost to the requestor, who

wants answers to facilities engineering problems. The additional manpower in the field will increase the mutual awareness between the Laboratory and its customers, regarding existing capabilities and new available knowledge. Tafoya said improved user productivity will be achieved, resulting in savings of resources, time and money.

The added field contacts through the representatives also will provide additional feedback to NCEL research efforts.

Hal Link (left) evaluates moisture damage to structural arches supporting a 40-year-old gym at Great Lakes Naval Training Center.

Off-loading at sea made easier by NCEL

A 51-ton Army tank rumbled across the deck of a ship moored two miles off the Virginia coast. It maneuvered down the ship's 24-foot wide ramp onto a floating platform of six connected pontoon causeway sections. Despite 2-1/2 foot waves, surging seas, and the shift in heavy weights, the platform maintained stability as the tank rolled safely across and aboard a landing craft for transfer to shore.

The event marked the first time military vehicles were offloaded from a commercial Roll-On/Roll-Off (RO/RO) ship in the open sea. The five-day test last fall demonstrated a new Navy capability for discharging rolling cargo at sea.

All told, more than 100 Army and Marine Corps vehicles were driven over the portable causeway sections which had been connected to form a common loading platform.

The offloading achievement was made possible by a new side-to-side connector designed and constructed by the Naval Civil Engineering Laboratory (NCEL), Port Hueneme, Calif. The connectors link the pontoon sections (each 21 feet by 90 feet) into a work surface 65 feet wide and 180 feet long. The connector was developed specifically to permit each pontoon section to float and react to wave action, independently of each other, while retaining the integrity of the total platform, necessary to accommodate vehicular traffic.

The new side-to-side connectors are an adaptation of NCEL'S end-to-end connectors (flexors) designed several years ago to replace the pin and link connection. The end-to-end connectors were adapted from a commercial barge-connecting system to make them compatible with Navy pontoons.

Built under contract, this portable calm water ramp will be tested at sea for the first time.

Real Navy personnel costar with Robert Wagner (center) who "joins the Navy" in an episode of "Hart to Hart". It was filmed at Pt. Mugu, Calif.

Navy officers 'star' in TV's 'Hart To Hart'

It's not every day that Stephanie Powers and Robert Wagner need Navy costars, but during a recent filming of the television series "Hart to Hart" they did.

More than 30 volunteers from the Port Hueneme Navy commands became actors and actresses for a day when they donned their dress white uniforms to dance and party on the set. Filmed at Point Mugu, the show is scheduled to air in the fall of 1983.

The script for this episode recalls Robert Wagner to active duty in the Navy. His special mission is to test electronic equipment for an F-14 aircraft. But, alas, he discovers that the "black box" has been sabotaged.

Navy personnel from Port Hueneme costar in a scene which depicts a reception for an admiral, complete with dancing and music by the Navy band.

NWC, China Lake gets Niblack history award

In the second annual competition for the Vice Admiral Albert Parker Niblack Award, judges from the Society for History selected the Naval Facilities Engineering Command as one of four commands to receive an Honorable Mention for superior accomplishment in the preparation of a command history. This year's winner of the prestigous Niblack Award is the Naval Weapons Center, China Lake, California.

Command Historian, Ms. Judith Johnston, prepares the NAVFAC Headquarters History History with the assistance of Dr. Vincent A. Transano, senior historian at the NAVFAC Historical Information Office, Port Hueneme, Calif., and his assistant, Ms. Carol Marsh.

Fiber Optics

. . . a comparatively new technology is doing the job at Kings Bay, Ga.

By John H. P. Cressman
P.E., Fla., Ga., N.C.

and

Richard A. Ramsey
E.I.T., Ga.
P.E., Tenn.

• Kings Bay, Ga.

Until recently, "fiber optics" was a term the average electrical engineer working for the Navy in the facilities area, associated with research laboratories and technical articles in professional journals. In the mid to late 1970's and early 1980's, private industry began test installations of fiber systems.

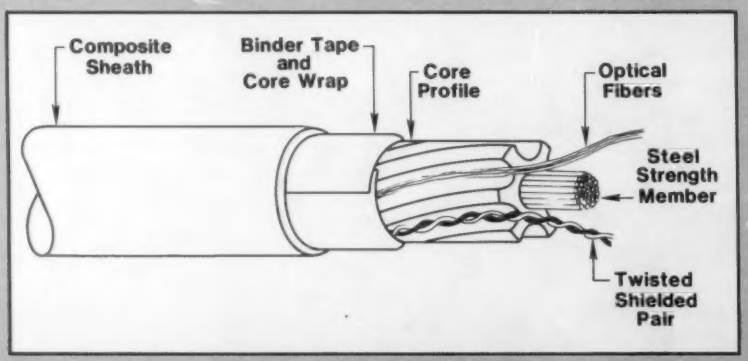
Primarily, fiber was used as a transmission medium for the telephone industry. The first systems employed complex and expensive transmission and receiving equipment. As usage increased, the cost of the fiber decreased and newer products were developed which both increased reliability and further decreased costs.

When the Navy decided to develop a new submarine base in Southeast Georgia, it was decided to consider recent technological developments in the selection of materials and systems to be used. One of the most promising developments was in the area of fiber optics.

As fiber waveguide is a dielectric, it is not affected by external electromagnetic fields. With Kings Bay being in an isokeraunic zone that experiences between 60 and 70 thunderstorm days each year, fiber optics became especially attractive.

The first application of fiber optics at Kings Bay was in the communications area. A requirement existed for an alternate telephone link from the Centrex Building in the Industrial Support Core to the waterfront. This offered an excellent opportunity to test a fiber communications link due to heavy usage, the redundant system could easily be compared with standard metallic circuits, and traffic could easily be switched to the metallic circuits if trouble was experienced.

On May 4, 1982 a contract was awarded to install a 5 1/2-kilometer fiber cable between the Centrex Building and the waterfront. At each end, the fiber terminated in optical span line equipment which included ITT FTS-3 Fiber Interface Panels and ITT 1324 PCM Multiplex Panels.



Composite Fiber Optic Cable

Although each fiber has the ability to transmit between 800 and 900 communication channels at the rate of 500 Mb/s per kilometer, the equipment at each end limited the transmission to 260 channels at a T-3 (44.736 Mb/s) rate.

The cable installed consists of eight multi-mode, graded index fibers. Although single-mode fibers have a greater information carrying capacity than multi-mode fibers, they are about 60 percent higher in cost.

The graded index fiber has a refractive index that varies with the distance from the center causing the light rays to be continually refocused by refraction in the core thereby minimizing pulse broadening.

The cable is suitable for aerial and underground use, both in ducts and direct burial. The initial installation was primarily aerial but is scheduled to be reinstalled in underground duct by a future contract.

The installation was completed on January 20, 1983, and the system was placed in operation at that time. Like most projects, minor problems were experienced at first. These problems were limited to improperly made fiber splices and defective printed circuit boards in the multiplex equipment and were quickly corrected. Because of the successful, maintenance free operation of the fiber circuits, the initial reluctance by telephone personnel has changed to unqualified support.

The next use of fiber optics was in the electrical system. Early in the design of the 230 kV transmission sys-

tem at Kings Bay, a decision was made to consider pilot wire relaying with back-up protection from distance relays.

Two items of major concern had to be considered, however: ground mat rise and longitudinally induced voltage. Discussions with General Electric and Westinghouse relative to the most effective relaying systems to use revealed that both were developing fiber optic protective relaying that might be of interest.

Of the two, only Westinghouse had fully developed the fiber optic current differential relay and had, in fact, delivered a system to the Duquesne Light Company.

A visit was made to Westinghouse to look at their fiber optic pilot wire relay and to discuss its possible application at Kings Bay. Westinghouse discussed the relay design and the results achieved in testing on model power systems.

From these discussions it was determined that the optically coupled pilot wire relays would solve problems with station ground mat rise and longitudinally induced voltages and would be applicable to the 230 kV transmission lines and the 12.47 kV closed loop distribution circuits serving explosive handling wharfs and submarine layberths.

In discussing reliability, Westinghouse agreed to replace, at their expense, the optically coupled relays with standard HCB or HCB-1 pilot wire relays if the Navy was not satisfied with the optical relays.

Because of this agreement, when the decision was made to use the fiber optic pilot wire relays, it was also decided to install a composite cable consisting of four optical fibers and four twisted shielded pairs.

This would allow for the conversion to convential pilot wire relays if necessary and would provide metallic pairs between substations that could be used for trouble shooting.

Unlike the fiber optic communications equipment, which uses a laser diode for a light source and an avalanche diode for an optical receiver, the optically coupled relay uses a light emitting diode for transmission and a pin diode for a receiver.

As the LED used has a light emitting spot of about 200 micrometers in diameter, with the 50 micrometer fibers used at Kings Bay a loss of approximately 14 dB results with another 2 dB loss occurring in the fiber connectors. These losses plus losses attributable to the cable and splices must be less than 40 dB in order to have sufficient light to allow the pin diode in the optical receiver to operate successfully.

The installation of the fiber optic relays is included in a large electrical distribution contract awarded on March 18, 1983. The work on this project is expected to take approximately 15 months and should be completed by late July 1984.

Additional projects using fiber optics are currently under design. These include fiber telephone circuits between the Centrex and a large EAPBX in the Trident Training Facility and fiber optic data links between Remote Terminal Units and the Central Control Unit for the electrical system Supervisory Control and Data Acquisition (SCADA) System.

In addition to reporting on system status and parameters such as voltages,

Because fiber optics is a comparatively new technology, obtaining the necessary information to use in preparing a construction contract was difficult. Manufacturer's data was easy to obtain but the lack of definitive standards made comparisons difficult. currents and demand, the SCADA system provides for control of 15 kV switchgear and 230 kV breakers from a central console. Because of this, the lightning immunity of the fiber circuit was an important consideration.

Since the initial contract, the Rural Electrification Administration has prepared an interim specification on totally filled fiber optic cable. Using this interim specification, manufacturer's data and information contained in technical papers, a guide specification for fiber optic communication cable has been developed for use at Kings Bay.

As hindsight has proven to be better than foresight, it is easy to see things that perhaps should have been done differently. Perhaps sharing these may help others. In selecting the cable to use, it is easy to lose sight of the capacity of each fiber. For most applications, four fibers will more than satisfy circuit requirements.

Another area to be considered is splicing. The two most important items to be considered are the qualifications of the splicer and the quality of the splice.

To insure the competency of the splicer requires that one successfully complete a fiber optic splicing course conducted by a fiber optic cable manufacturer or demonstrate proficiency by successfully making five successive splices meeting contract requirements.

Equally important is testing of the splice. Each splice should be tested at the time of the splicing. Any splice with a loss of 0.5 dB or more should be remade.

Although fiber optics is a newer technology, it has much to offer. The large bandwidth, low loss, EMI immunity, and small size are especially attractive.

As the use of fiber goes up, the cost of development will be satisfied and the cost of fiber systems will decrease. Installations with government owned telephone systems, closed circuit television systems or large data circuit requirements should consider fiber as a possible alternative transmission medium. □

The fiber and optic terminal and multiplex equipment at Kings Bay.

reader's comments/questions

departments

Navy attitude "unsurpassed" says RADM

By the time the next issue of "Navy Civil Engineer" is published, I will have joined the retired list of CEC Reserve Officers. As I leave the Reserve Force I would like to share a few thoughts with your readers.

During my 30 years as a CEC officer, I have had the opportunity to observe a dramatic change in attitude among the reserve and active officer corps. When I first was selected as a reserve officer, it was almost four years before I even met another reserve CEC officer much less an active officer. It was not until 1968 that a concerted effort by both the active and reserve leaders, including our present Admiral Zobel, that the one-Navy and one-force concept became a reality.

Today we in the Navy's civil engineer community enjoy a relationship that is unsurpassed in the world. We as reserve and active officers belong to a one-force Navy where there is respect and acknowledgment of the strengths of both the active and reserve that is truly outstanding.

It has been my privilege to have served with what I consider the best of all the services because the professionalism and pride in accomplishment is exceeded by none. I leave the service of the naval reserve knowing that at least one part of our nation's defense is in good hands and that it is capable of handling any problems that might be thrust upon the NAVFAC family.

Roy "L" Dunlap
RADM, CEC, USNR-R

Thank you sir for your honest and inspirational message. I'm sure it will cause many readers to pause and realize that what you say is true.

Florida reader knows his baseball

I was thoroughly enjoying LCDR Thompson's article on Omaha in your Spring 1983 issue until I came to the part about the "Outstanding minor league play of the Kansas City Royals." As a long time fan of K.C. baseball, I can assure you that everything "minor league" about the team went to the west coast with Charlie Finley, Monte Moore, and the rest of the Athletics after the 1967 season. Recent editions of the K.C. Royals have played outstanding and exciting major league baseball. If the article reference was to the Royals' Omaha AAA farm team, my apologies; the distinction was not obvious.

Otherwise, the article was very interesting and informative, as was the rest of the issue.

Larry Horn
Public Works Center
Pensacola, Fla.

Thanks for setting the record straight. Boy, is my face red!

Your story displayed the mettle of the Seabees

The picture on the back cover of Navy Civil Engineer of Spring 1983 certainly brought back a lot of memories (Filming of "Fighting Seabees" starring John Wayne). Probably the most memorable situation in the "Fighting Seabees" was the time when the bulldozer overran the Japanese pillbox. The Battalion was the 87th and the catskinner was Aurelio Tassone, Fireman 1st Class. But, it's a long story.

Enclosed are copies from the 87th Yearbook which describes the incident on Mono Island on October 27, 1943. As the last skipper of the 87th on Okinawa, I was proud to be a part of these "Fighting Seabees."

James Douglas
CAPT, CEC, USN (Ret)

It is the interest of readers like you, Captain Douglas, that help to make the magazine what it is and also make it an honor to be associated with it. The article you read was an experimental new feature (Moments in history). Thanks to the reaction of you and other readers, we hope to publish more "Moments in history," and when we do, we plan to begin with the story you submitted about Aurelio (Ray) Tassone, the Italian-American lad who single-handedly destroyed an enemy pillbox with his bulldozer.

We may have committed a faux pas!

I am writing in regard to your cover story in the Spring 1983 edition of the *Navy Civil Engineer* regarding women in the CEC. On page one under "the cover," you describe the women pictured as, "All are educated, intelligent personable and all are engineers." Beginning on page two, you provide background information on each of the five women. I was interested to note that both Ensign Sheila Hixenbaugh and Ensign Penny Newcomb received degrees in architecture. I do not intend to raise the classical engineer vs architect discussion. However, I am concerned that the two individuals may have been offended when you referred to them as engineers. I personally view your oversight as substantive and hope you will find it appropriate to print a correction.

I believe the *Navy Civil Engineer* is a fine publication, and accurately reports on current issues and trends in the facilities engineering business. Keep up the good work.

C. H. Schneider
LCDR, CEC, USN
NORTHDIV NAVFAC

Thank you for your nice words, and for being interested enough to call our attention to what might be called a "goof." Of course it isn't our aim to offend anyone and if we have done so, our sincere apolo-

gies are hereby recorded to ENS Sheila Hixenbaugh and ENS Penny Newcomb.

Around here (editorial offices are located in the Naval School), everyone is referred to as "engineers." I, as the editor, never hear the distinction made between architects and engineers, or even between different types of engineers. Thanks for writing, LCDR Schneider. We're going to try harder! (It would be interesting to hear from some of you architects on this subject. How about it ENS's Hixenbaugh and Newcomb?)

Reader praises Buffalo's article on coastal engineering

It's been years since Harold Welsh and I communicated concerning some articles I had written for the *Navy Civil Engineer*. But the article in the Spring 1983 issue on "Wave Action" by John Buffalo prompts me to write to you to compliment you and the author on selecting and producing an informative and easy-reading technical article.

While on active duty, but more particularly since I retired a few years back, I have been involved with Coastal Engineering. There have been great strides made in understanding the forces of nature at work along our beaches, and Mr. Buffalo has encapsulated these newest theories well. One important force he did not include is the dramatic increase in sea level that is being recorded - up to three inches in ten years. On a sloping beach, that apparently small rise reduces the shoreline by many feet.

A very good book on the general subject is *The Beaches Are Moving* by Kaufman and Pilkey. After reading of the Seabees heroic efforts at Seal Beach in our magazine, I was reminded of one of my favorite quotes from the book. "If anyone were taking bets on whether man or the sea will win the struggle of the beaches, we would bet heavily on the sea."

Jack Moger
CAPT, CEC, USN (Ret)

Your letter made two people extremely happy - Mr. Buffalo and me. It's reassuring to know that someone with your expertise in the field of coastal engineering agrees with our selection of material.

A pioneer speaks her mind about women in the CEC

I read with interest your article on women in the Civil Engineer Corps; however, having been one of those pioneers myself, I feel compelled to correct some factual errors in the article.

Contrary to your article, it would not take an act of Congress to allow women to serve in Naval Mobile Construction Battalions (NMCBs). While the law does prohibit women serving more than 180 days aboard combatant ships and aircraft, there is no law which specifically prohibits women from serving in the Seabees, nor does the law prohibit women from serving in a war zone, as is popularly thought. It is merely a Navy *policy* that women not be assigned to NMCBs, and if the CEC really wanted women in NMCBs, the policy would be changed.

As more women enter the CEC, the limitations on their choice of duty (i.e., no Seabees) will begin to restrict their chances for promotion, and, in some cases, their ability to perform their assigned jobs. In lieu of real Seabee duty, women are assigned to staff Seabee jobs (i.e., COMCBLANT or COMCBPAC). In peacetime, it is merely poor management to assign someone to a staff job where (s)he makes decisions affecting Seabees, without the benefit of prior Seabee experience. In wartime, this short-sightedness could be fatal.

While on active duty, I heard on sorts of ridiculous arguments about why women couldn't be in the Seabees, everything from "we'd need separate toilets" to "women can't lead men." Balderdash. As to the first argument, Seabees more than anyone ought to be able to construct toilet facilities for women, and as to the second, the women I've known who've had opportunities to lead Seabees have never had a problem. Some women can't lead men, I'm sure, but then I know a lot of men who can't lead men, either. Leadership is not sex dependent.

I was happy to read that the women in the article felt that there is less discrimination in the Navy than in the civilian world, and that they are enjoying their CEC careers. I enjoyed my three years on active duty and wouldn't trade it for anything, but high among my reasons for leaving was the discriminating policy towards women in the Seabees. More than that, it was the attitude among so many peers and superiors that women didn't really have a place in the CEC. I've found the business world to have problems, too, but my male peers and superiors are a quantum level more supportive and accepting of women. I'm sorry to say that, because the armed forces above all should be an equal opportunity employer. In wartime, bullets don't discriminate.

I wish these young women well, for they are in for a great experience, but they should know that they are going to have to fight a peacetime war to get the same opportunities in the CEC that the men have already. It's worth fighting for, however, for it will be a much better CEC when everyone's abilities can be drawn upon fully.

Mary A. Davidson
LT, CEC, USNR-R
University of Pennsylvania

Thank you for your letter and for your viewpoint. Perhaps it will inspire other readers to respond to this column on the very same subject. We'll print anything that is reasonable.

Electric cars tested at PACDIV

A special built-in safety feature of the electric vehicle prevents the car from operating while the charger cord is plugged in.

By Jeanne A. Light
Public Affairs Officer
Pacific Division, NAVFAC

• Pearl Harbor, Hawaii

It wasn't many years ago that the idea of outer space travel provided a good script for a science fiction movie. Today, space travel is a reality.

It also wasn't very long ago that the idea of driving around in automobiles which didn't require gas, but operated instead on electricity, seemed a little far fetched. Today, that too, is reality.

In June 1983, the Navy in Hawaii took possession of six brand new electric automobiles for testing and evaluation.

The cars, all Ford Escorts, are fully electric with standard transmissions. They can travel at a top speed of 75 miles per hour and cover a round-trip distance of 50 miles before an overnight charge of approximately 12 hours is required.

According to Herb Coleman, a transportation specialist at the Pacific Division, Naval Facilities Engineering Command (PacDiv), "Back in the mid-1970s, PacDiv began looking into alternate means of transportation. Then in 1980, when our headquarters in Washington, D.C., had developed a good alternate transportation program, we sent them a letter telling them we were interested in testing electric cars if and when they became available."

Specialist Don Patterson finds the gauges of the electric car are different from the gasoline car.

That day came June 10.

PacDiv will keep two of the cars at its Makalapa headquarters, and has assigned the others to other Navy activities in Hawaii for testing and evaluation.

The six cars bring the total number of electric cars in the State to 31. The University of Hawaii is testing 10 and Hawaiian Telephone Company has 15.

"We plan to talk to the University and Hawaiian Telephone Company officials to get the benefit of their testing and learn of any problems they may have had," said Coleman.

Just looking at the vehicles, you'd never know they were electric were it not for the decal on the side. Open up the hood, however, and you experience your first shock. There's no engine! In its place are two battery boxes. A third is located in the trunk, in a compartment under the spare tire.

Sixteen 6-volt lead/acid batteries power the car, and one 12-volt lead/acid battery supplies power for the lights, radio, and other accessories.

PacDiv Commander Rear Admiral Howard H. Haynes took the electric car for a test drive accompanied by Navy physicist Dr. Richard Roberts. Dr. Roberts manages the Alternate Energy Programs at Naval Weapons Station in China Lake, Calif., and is responsible for developing alternate energy sources, particularly electric vehicles.

RADM Haynes noted that driving the car was very similar to driving a golf cart.

When you turn the key there's no start up whirring noise and it's hard to believe the car is on. Shifting and changing gears is the same as a standard transmission car except you don't press the accelerator until the clutch is completely out.

The electric car, according to Coleman, is about 1,000 pounds heavier than its gas-powered counterpart, making it more difficult to steer than a conventional car. But the soundlessness of the ride is very impressive.

Most of the instruments and controls are the same as ordinary gas-powered vehicles. In place of a gas gauge is a meter which shows the percentage of full charge remaining in the batteries. The instruction manual warns it is as important to monitor this gauge as it is to monitor the fuel gauge.

You can imagine why. In a conventional car, should you run low on gas, you can easily pull into a gas station and "fill 'er up." With the electric car, it's another story.

To recharge the car, a charger cord is plugged into the charger socket located on the rear fender, and then connected to a 220-volt grounded AC power source. The charger turns off automatically when the batteries are fully charged. A built-in safety device prevents the car from operating if the charge cord is not unplugged.

The electric car gas tank holds approximately 2.5 gallons of fuel (either diesel or gasoline, depending on the model) used only to supply fuel for the car's heating system.

According to Coleman, the electric cars cost almost twice as much as their gas-powered counterparts. "The Department of Energy paid $12,000 each for the car when the gas-powered Ford Escort was running approximately $6,000," he said. He noted, however, that if and when the electric car gets into mass production, the price should drop considerably.

PacDiv will be testing and using the cars for at least six months to a year. "At that time, we'll see what the state of the art is then and decide if the cars are suitable to our needs," said Coleman. □

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Navy Civil Engineer

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Please Invest 3 Minutes of Your Time! — Submit Prior To January 17, 1984

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I usually read: ☐ all; ☐ more than half; ☐ less than half; ☐ hardly any of the contents of The Navy Civil Engineer.

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	Excellent	Good	Fair	Poor
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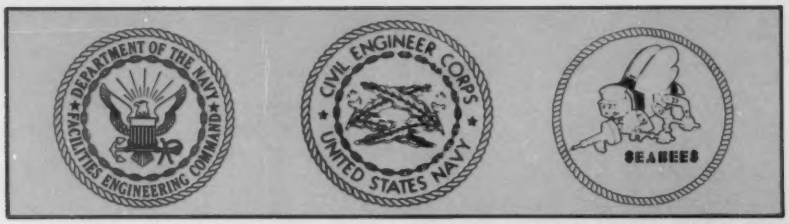

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Worldwide assignments for 17 new graduates

★ **ENS Mark G. Locastro**
BSCE/Florida U.
to Atlanta, Ga.

ENS Broderick C. Attra
BSCE/VMI
to Okinawa

Seventeen new officers joined the ranks of the U.S. Navy's Civil Engineer Corps on June 10, 1983, upon graduation from the Naval School, Civil Engineer Corps Officers, Port Hueneme, Calif., and have accepted assignments all over the world.

The class, Number 167, completed eight weeks of specialized training pertinent to the Navy's needs for shore installation engineering, public works management, and Seabee operations.

Three graduated with honors: ENS Mark G. Locastro was the outstanding graduate. Two graduated with distinction: ENS Joseph W. Herron and LT Robert W. Sherrill.

ENS Locastro's photograph is indicated by (★). Students graduating with distinction are indicated by (●) and those entering Seabee duty by (†).

† **ENS David M. Boone**
BSCE/Cal. Poly. State U.
to Port Hueneme, Calif.

ENS Terrence A. Brewster
BSEE/Southern U.
to Quantico, Va.

ENS Michael E. Durant
BSME/Brigham Young U.
to Twentynine Palms, Calif.

ENS David A. Gierach
BSEE/Florida U.
to New Orleans, La.

ENS Robert D. Gilmore
BSCE/Cal. State-Fresno
to China Lake, Calif.

ENS Daniel C. Harrison
BSCE/Alabama U.
to Memphis, Tenn.

• **ENS Joseph W. Herron**
BSCE/Kansas U.
to Vallejo, Calif.

LT Jimmy S. Hirakawa
BSCE/Nebraska U.
to Seal Beach, Calif.

ENS Kyle R. Jensen
B. Arch./Illinois U.
to Groton, Conn.

† **ENS Joseph A. R. Larry**
BSCE/W. Va. U.
to Port Hueneme, Calif.

ENS James H. Riley, Sr.
BSCE/Louisiana Tech.
to Dallas, Texas

• **LT Robert W. Sherrill**
SBAA/M.I.T.
to Long Beach, Calif.

ENS Douglas P. Taylor
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to Great Lakes, Ill.

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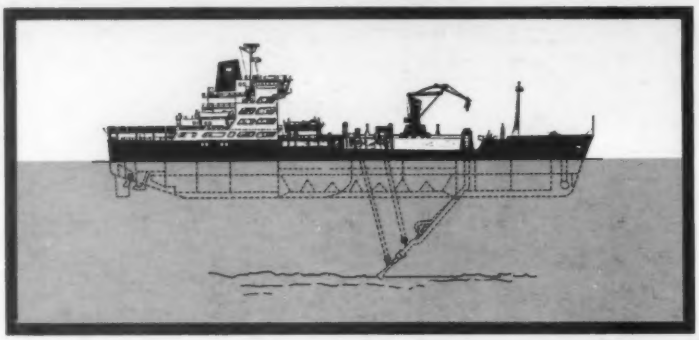
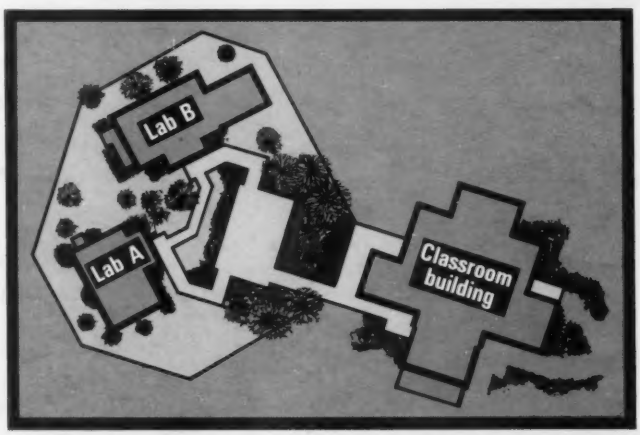
B. Arch./Maryland U.
to Pearl Harbor, Hawaii

ENS James P. Walker
BSCE/Cal. State
to Newport, R.I.



A new look in dredging – Page 2

Are you ready for a power outage? – Page 5



Family housing management taught a new way – Page 12

Abandoned gas cylinders can be hazardous – Page 22